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A window open on the world

The UNESCO Courier

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THE ROOTS OF PEACE

UNESCO ARCHIVES

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TREASURES OF WORLD ART ❶

Neolithic lady (Dobruja, Rumania)

Each month on this page the Unesco Courier will publish an outstanding, though little known work of art from a different country. Here we present a 6,000 year old figurine of a woman which despite its great age is extraordinarily modern in appearance. The work of a Neolithic artist, it was found in 1956 in a cemetary of 350 graves uncovered at Cernavoda in the Dobruja region of eastern Rumania. Only 11.4 cm (4½ in.) high, it was modelled in brown clay and covered with a brownish-black substance. Extremely rich finds have been made on Neolithic sites in the Balkans and in Anatolia in the course of excavations carried out by Rumanian archaeologists in the past ten years.

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Page

4 **MESSAGES TO THE STARS**
Communicating with alien intelligent beings
By D.M.A. Mercer

8 **GALAXIES CAUGHT IN A STEEL MESH**

11 **NEW PATTERNS OF TRANSPORT FOR AFRICA**
By W. H. Owens

16 **DANTE : THE PRIMACY OF POETRY**
By Ilya Ehrenburg

22 **THE ROOTS OF PEACE**
A pioneer effort in peace research
By Bert V.A. Röling

27 **BEAUTY AND THE BEAST**
The story of man through his art
By Pauline Bentley

32 **LETTERS TO THE EDITOR**

33 **FROM THE UNESCO NEWSROOM**

34 **THE INNER NATURE OF SCIENCE**
By Warren Weaver

N° 1 - 1966 MC.65-1-209 A

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Cover photo

In recent years a new expression —"peace research"— has entered the language. Peace research is a pioneer effort being made in different countries to analyse, scientifically, the vast complex of factors which influence the stability of world order and the relationships between nations. It deals with all types of war: intentional, unintentional (war as a traffic accident) and civil wars. (See page 22)

UNESCO ARCHIVES

MESSAGES TO THE STARS

by D. M. A. Mercer

FACE IN SPACE
A profile of the human face seems to float among the myriads of stars in this enlarged photo of the Milky Way. The brightly luminous nebula forming the outline is visible in the constellation of Cygnus (the Swan), distant from the earth by 1,000 light years.

© Observatoire de Paris

IF we woke up one morning to find, hovering over our city, a space-ship from a distant galaxy, we would no doubt view it with very mixed feelings. But after the initial surprise had subsided, the very practical question would arise how could we get in touch with its crew? If we did not, at best the ship might simply consider that there was nothing of interest in the vicinity and go away—and we would have lost an almost unique opportunity of immense potentiality. But at worst, the ship might have the means of destroying our whole planet. For a variety of reasons, we would find it imperative to communicate with the crew (or with the ship if, as may well be the case, it is an unmanned robot).

But how should we start to communicate? Obviously there is no point in flashing English messages in the Morse code. What means should we use? Clearly this needs a good deal of thinking through, and it is this subject which I want to deal with—the basis of communication with alien intelligent beings (I use the word "alien" in the science-fiction sense; the inhabitant of another part of the physical universe who may have no necessary common physical traits with us).

All we know about these people is that they are intelligent —they must be so, or they could never have built a space-ship. Any communication must be on the basis of our common intelligence. This puts the problem in the best way—what is the basis, the lowest common multiple, if you like, of intelligence: something which is common no matter how much its physical vehicle changes. If we can understand this, we can understand how to communicate: in fact the two problems are bound up with each other.

To start with our case of the space-ship which has appeared in our vicinity, we assume that its builders are (1) Intelligent; (2) At least as far advanced scientifically as we are, and probably much more so; (3) Interested in finding other intelligences. (This is probably a fair assumption, as they have apparently sent an exploring spaceship although it is not impossible that races who are completely withdrawn and introverted exist.) (4) Ready to communicate and to receive signals, and also to try to interpret them.

This last point is important, and it needs some discussing. The probe will obviously not expect communication in its own language. In fact, we must both seek a common language. This is rather like the problem set up in certain branches of game theory. You are to meet someone in London on a particular day, but neither of you has any knowledge of the time or place; you must choose not what seems obvious to you, but what *you* think *he* thinks *you* will choose in the situation in which you both are, etc. (You might in this case choose Piccadilly Circus at 12 noon, for instance.)

To follow this thought up, we should ask what signals would show that we are intelligent, and would be so understood by the probe. Any signals we send must look artificial—space is full of light and radio waves, and our signals must clearly look as if they have not arisen from a natural source.

I don't want to spend time discussing the mechanics of signalling, except to say that we are limited, over long distances, virtually to two means: short-wave radio, and "laser" light beams. For most purposes it appears that radio is preferable. I might also remind you that such waves travel at the speed of light; so to communicate with a planet 10 light-years away, the round-trip signal would take 20 years! Clearly there is little scope for rapidly changing one's mind while conversing.

In many cases, we are limited to sending a series of identical signals in time—i.e. a train of pulses of electromagnetic energy, either radio beams or light beams. One such series which has been suggested is a series of prime numbers (numbers which have no factors, but are divisible only by themselves and 1). If we send pulses in groups of 1, 2, 3, 5, 7, 11, 13, 17... etc., they will clearly come from intelligent beings. No radio storms in the galaxy, or any other natural process, will produce prime numbers.

o..oo..ooo..ooooo..ooooooo..ooooooooooo..oooooooooooo..

Fig. 1

They might be indicated as in Fig. 1, in which we choose a fixed spacing in time for the pulses, indicated by the space between symbols. A dot means the absence of a pulse, and a circle means a pulse.

CONT'D ON PAGE 6

D.M.A. MERCER, *of the Physics Department of the University of Southampton (United Kingdom) is a specialist in acoustics.*

How to devise an interplanetary signal

We might also try a series of squares, 1, 4, 9, 16..., or the digits of π, the ratio of the circumference of a circle

o..oooo..oooooooo..oooooooooooooooo..oooooooooooooooooooooooo..

ooo..o..oooo..o..ooooo..oooooooo..oo..oooooo..ooooo.ooo..oooooo..

Fig. 2

to its diameter, 3.141.592... (Fig. 2). This, being a ratio, is independent of the units of measurement. It does however raise the sort of point which we will be considering again—can we assume that the circle is such a fundamental idea that any intelligent being, however alien, will know it? I think we can make this assumption; any being with any knowledge of working materials, such as constructing radio transmitters, must be familiar with the circle.

At this stage it might be pointed out that we could make pictures. It has been suggested in the past that we should build an enormous chain of beacons over a large land-area, showing, for instance, Pythagoras' theorem

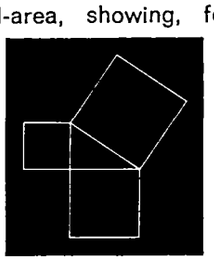


Fig. 3

(Fig. 3). If a space-ship were hovering overhead, this would certainly be possible; although we might well want to indicate that we had progressed further than the ancient Greeks, and some more sophisticated diagram, of the sort to be discussed later, might be more appropriate.

Such beacons however would be visible only to something close at hand—an alien space-ship orbiting the earth, as I mentioned earlier. What if we tried to send signals to a distant planet? Is there any way in which we can send pictures to them?

Before discussing this, perhaps we should consider two further fundamental points. One is that we assume other alien races have eyes, or at any rate some corresponding sense organs. The other is that they can understand pictures, which are two-dimensional representations of three-dimensional objects.

Here again, we feel that a sense of vision must be essential to anyone with an advanced technology. Secondly, we feel that such an advanced technology must deal in pictures and diagrams. We may be wrong over this; there may be races dependent entirely on tactile senses dealing directly with three-dimensional objects. All we can say is that it seems unlikely: this is the sort of thinking we must however attend to if we are to establish a basis for a universal intelligence.

While on this point, we ought to consider a little further the modes which intelligence can take. There may be some intelligent races which are completely withdrawn and introspective, wishing to have no contact with anyone outside. There may be others who are uninterested: they may have solved all their political and economic problems, and spend their time watching television.

There are two other cases which may raise problems; one is the case of beings whose processes are very slow compared to ours. Although they may be intelligent, it would be virtually impossible to communicate with them. The other is the case of a civilization well versed in the abstract virtues of goodness, truth and beauty, but without any technology.

These would be difficult to communicate with—as a superior alien community would have found the classical Greeks—but I do not think there is an absolute bar. I don't consider that any entirely abstract philosophy can exist in isolation from the real world: even on this earth, our most idealist philosophers slip in ideas of material things—counting, for example—which they could not do if in fact mind were the only thing which existed. (And it is worth noting that the ancient civilizations have led, in time, to our technological one.)

Returning to the problem of sending pictures, in fact it is not too difficult to do so by a series of pulses. Suppose we send a series as in Fig. 4. By itself it is not very

ooo.....o.....ooo.....

.....o.....o.....ooo.....o

.....o.....ooo.....o.....

.....o.....ooo.....o.....

.....o.....ooo.....o.....

..o.....ooo.....o.....o...

ooo.....o.....o.....ooo.....

.....o.....o.....ooo.....

.....o..... *Fig. 4*

meaningful. If however we cut off each series beginning with three circles, and put them all one above the other, we have a diagram of a circle, Fig. 5. This of course is

ooo o

ooo o o

ooo o o

ooo o o

ooo o o

ooo o o

ooo o o

ooo o o

ooo o *Fig. 5*

a form of scanning in exactly the same way as that carried out in a television receiver.

Alien races may not have the same sort of television of course—their sets may scan in a spiral—but we would think that they would be intelligent enough to try various ways of superimposing traces until they hit on a "meaningful" one. (Here again I am assuming that "meaningful" has the same connotation to *any* intelligent being—i.e. that the ideas of "random" and "ordered" are universal.)

o.o.....oo.....oooo...o....o...o..o.....o...o

....o.....o...ooo.....o....o..ooooo...o....ooo....oo....o...

.o....o.....ooo.....o...o....o...o.....o.o...o.....

..oooo.....oo.o *Fig. 6*

There is in fact another way in which we can send pictures in a rectangular array. Suppose we send a series such as Fig. 6, starting and ending with one pulse, and

CAN YOU DECIPHER THIS INTERPLANETARY MESSAGE ?

In 1960, Ivan Bell, an English language teacher in Tokyo, heard about Project Ozma, a scientific plan for listening in for radio messages from outer space. To amuse his friends he devised a simple interplanetary message of 24 symbols. It was printed in The Japan Times of January 22, 1960, and readers were asked to decipher it. The newspaper received four complete solutions, including one from a U.S. reader who wrote her answer in the same code, adding that she lived (by Jove !) on Jupiter. Here we reproduce Ivan Bell's lighthearted exercise in coding an interplanetary message. The message is extremely simple to decipher; far far simpler than it looks. All readers are urged to try their hand at it—and if they fail, let them ask their children to help. Three words of advice: (1) Don't be afraid to use paper and pencil. (2) When you've found the solution you won't have to ask, "Is this it?" ; you'll know you have the answer. (3) The key to the solution is to be found in paragraphs 2 and 3. Paragraph 1 simply lists the alphabet (minus letters O and X). Answers will be published next month.

1 A.B.C.D.E.F.G.H.I.J.K.L.M.N.P.Q.R.S.T.U.V.W.Y.Z.

2 AA, B; AAA, C; AAAA, D; AAAAA, E; AAAAAA, F; AAAAAAA, G; AAAAAAAA, H; AAAAAAAAA, I; AAAAAAAAAA, J.

3 AKALB; AKAKALC; AKAKAKALD. AKALB; BKALC; CKALD; DKALE. BKELG; GLEKB. FKDLJ; JLFKD.

4 CMALB; DMALC; IMGLB.

5 CKNLC; HKNLH. DMDLN; EMELN.

6 JLAN; JKALAA; JKBLAB; AAKALAB. JKJLBN; JKJKJLCN. FNKGLFG.

7 BPCLF; EPBLJ; FPJLFN.

8 FQBLC; JQBLE; FNQFLJ.

9 CRBLI; BRELCB.

10 JPJLJRBLSLANN; JPJPJLJRCLTLANNN. JPSLT; JPTLJRD.

11 AQJLU; UQJLAQSLV.

12 ULWA; UPBLWB; AWDMALWDLDPU. VLWNA; VPCLWNC. VQJLWNNA; VQSLWNNNA. JPEWFGHLEFWGH; SPEWFGHLEFGWH.

13 GIWIHYHN; TKCYT. ZYCWADAF.

14 DPZPWNNIBRCQC.

Punctuation marks are not part of the message but indicate time lapses.

repeating this series many times. If you count the total number of symbols, (i.e. circles + dots) it comes to 203. This is a number which can be decomposed in only one way, 7 × 29. If we do split it up in this way, in a rectangular array 7 × 29 we arrive at Fig. 7.

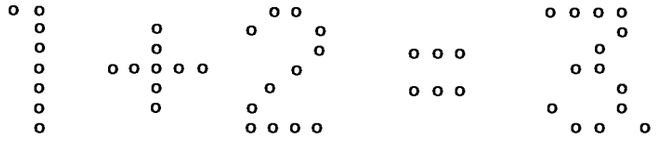


Fig. 7

Of course this expression 1 + 2 = 3 would mean nothing as it stands, but I am simply indicating that it is possible to send pictures using a train of pulses; and the pictures could of course be much more complex than this. What in fact should we send? I mentioned that we wanted something more advanced than Pythagoras' theorem. One subject we do know about is the way in which atomic nuclei can be split up in reactions taking place in stars. One such reaction, believed to be correct, is when lithium and hydrogen combine to form carbon and helium.

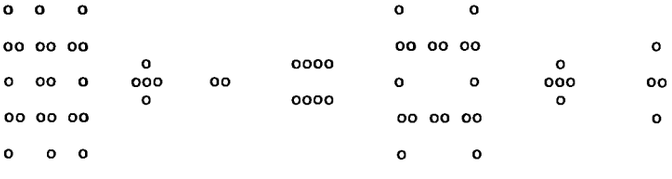


Fig. 8

If we indicate this as shown in Fig. 8, in which the single and double circles represent two different types of elementary particles in the nuclei, it is probable that it will be recognised. (Of course we would use predetermined signs for the plus and equals.) The alien races will then know that we understand stellar reactions. We could send diagrams of the carbon cycle, indicating that we live on the basis of carbohydrate chemistry. We should perhaps send diagrams of our local constellation and solar system.

Apart from all this, once one can send pictures the problems become standard ones of education and logic. It is however a fascinating idea to compile an educational series on "All about us and our world—for someone who has never seen any of it." Think of putting together the whole sum of human experience and existence in a series of programmes. I would like to see some television series' experts try it.

Quite apart from the problem of sending information, however, there is the problem of listening. Suppose other advanced galactic communities are trying to beam information at us? What should we be listening for?

Once again we are considering intelligent signals, differing from the natural signals in the universe. There is one way in which perhaps detection can be made easier,

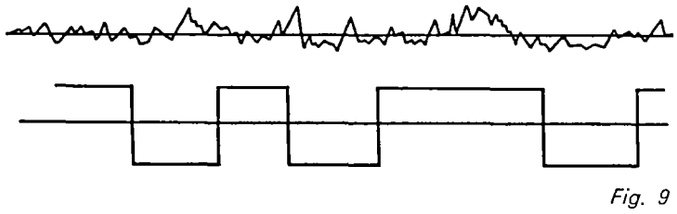
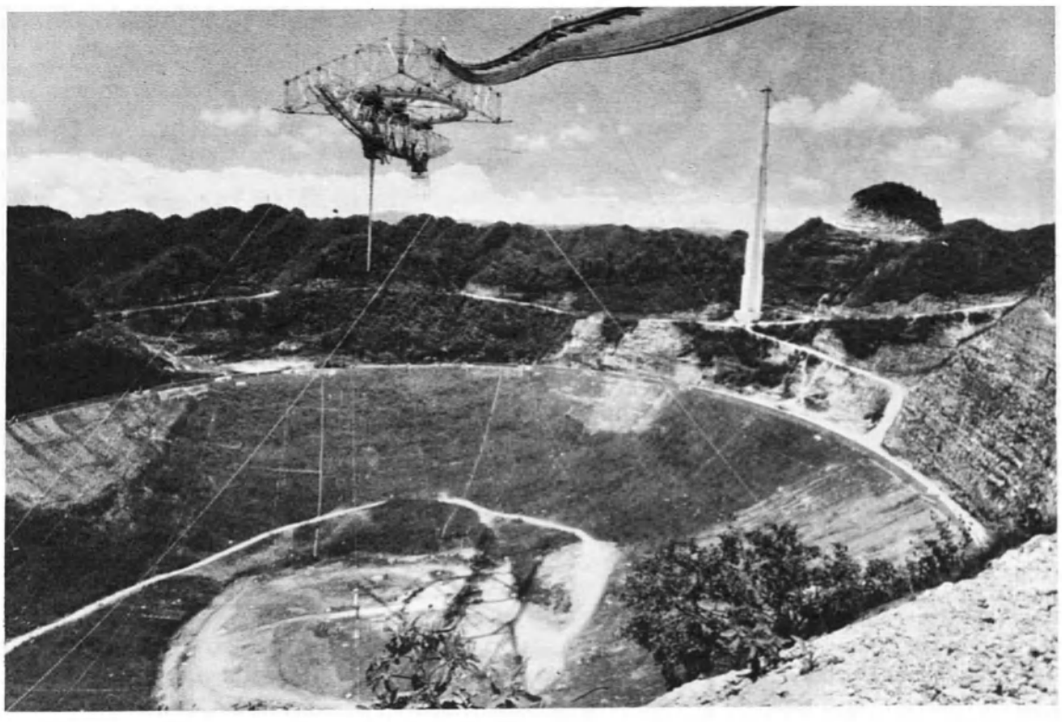


Fig. 9

without examining every one in detail. Fig. 9 shows the forms of two types of signal: (a) is noise, (b) is man-made. The time spent by each near its zero line is quite different: (a) spends a large proportion of its time near its zero-line, the proportion becoming less the further away it gets; (b) spends all of its time a fixed distance from its zero-line. The test, in other words, to distinguish between

CONT'D ON PAGE 10

Distant galaxies caught in a steel mesh



Left, general view of the Arecibo radio-radar telescope. Its giant bowl-shaped reflector, covering over 18 acres (7 hectares), is made up of some 11,000 sections of ½ in. (1.25 cm.) thick wire mesh. Suspended above the centre is the focusing device weighing 500 tons (close-up photo right) which can be moved about to allow the telescope to scan a large area of sky. The telescope's position, 18 degrees north of the equator, enables it to reach all the planets, for at that latitude they pass high overhead.

AMONG the rugged green hills near Arecibo, Puerto Rico, scientists and engineers have built the world's largest radio-radar telescope. Its bowl-shaped reflector, which lines a vast natural hollow in the hills, is a taut expanse of steel mesh covering over 18 acres. Five hundred feet above it, suspended from cables supported by three tall towers, is a 550-ton complex of girders, wires and machinery. This is the telescope's focusing device. A 96-ft (30 metre) metal finger points downwards to send radio waves to the mesh which then reflects them into outer space. When these reflected waves strike something they bounce back. Scientists analyze the returning signals for information about the object encountered in space. The equipment operates as a radio telescope when only the reflector (antenna) and receiver are used; as a radar telescope when short pulses of radio waves from a transmitter are distributed over the reflector. A beam of pulses is directed to a target in space, and when they bounce back the reflector is used a second time to receive them. The telescope was originally designed for studies of the ionosphere, the rarefied outer atmosphere of the earth, but is now being used also for radar exploration of the solar system and for receiving radio signals from some of the most distant objects known to astronomers. The great potentialities of radio astronomy for revealing the large-scale structure of the universe became fully appreciated in the 1950s, when it was discovered that some of the most intense celestial radio emitters, hitherto known as "radio stars" were, in fact, galaxies so distant as to be on the verge of detectability with the largest optical telescopes. As Sir Bernard Lovell, director of the Jodrell Bank Radio Astronomy Laboratories in England, points out in the December, 1965 issue of Science Journal, published in England, for nearly 20 years the combined work of the optical and radio astronomers has been revealing a cosmos of ever increasing fantasy. The penetration into space had increased so rapidly that already in 1960 it became possible to identify a radio galaxy (3C295) 4,500 million light years distant from the earth.

Photos © Gunther - I.L.N. - Holmès-Lebel

Maintenance worker skis across the wire mesh of the reflector which has a diameter of 1,000 ft. (350 metres). Keeping the mesh clear of paper and leaves is a never-ending job.

40 years for an answer to come back

natural and artificial is a *statistical* one, and can readily and quickly be applied, without studying each signal in detail.

I might point out that we could learn a good deal about the other planet just by the character of the radio signals, quite apart from their information content. If the signals appear at more or less fixed intervals, we might assume that this represents the length of their day. The basic frequency of their radio signal will slowly change, due to the transmitter moving towards and away from us, due to the rotations of the planet on its axis and about its star (this is the well-known Doppler effect.) From a study of this frequency, we could deduce these quantities, and hence find something about their planet's behaviour. We might even, from this, be able to identify their star.

It is necessary to digress to consider just how many advanced communities there may be, as the type of signal received (or the type we send) does depend on it.

AS far as we know, a small fraction of stars have planets. For any planet to be able to support life, it must be neither too hot nor too cold because life depends on chemical reactions, which will proceed too slowly at low temperatures, and will not proceed at high temperatures because substances decompose. (We know that the whole universe is made of the same materials we are familiar with, and the same general laws of chemistry apply.)

Thus only a fraction of planets will be at the appropriate distance from their stars. Further, only certain types of star are suitable; they must give a constant energy output over the biological time-scale.

When all this has been worked out, the next problem is how long may technologically advanced communities exist, compared with the whole time life has existed on their planet? This is a matter for speculation: perhaps by sociologists. In our own case, for instance, we have had radio for only some 60 years, while life has existed over the vastly longer biological life-time scale.

If we can imagine advanced communities existing for much longer than our 60 years, we arrive at the quite speculative figure that there may be some hundred million advanced communities throughout our universe (taking the number of stars in the universe to be denoted by a 1 followed by 21 zeros, i.e. one thousand million million million).

The general thinking in this section will be seen to stem from one aspect of the "cosmological principle"— namely, that there is no reason to assume that we on this earth are unique, or specially privileged in any way.

This is not a very useful figure, because many of those communities will be immense distances away. But to come nearer, within 15 light-years of us there are seven "suitable" stars; within 50 light-years there are 100 "suitable" stars. That is, there is a small probability that some advanced communities are within hailing distance.

There is another conclusion to be drawn, however. The lifetime of a technological community is probably so much longer than the time we have had modern technology, that nearly all the galactic communities are far more advanced than we are. They may already be in a "galactic" club, busy communicating; and they may maintain a small subdepartment who are beaming messages at other likely stars in the hope that they may discover some novice community, just on the threshold of interstellar communication, to whom they can send their kindergarten messages and gradually educate to their standards. It is a humbling thought.

What all this means in practice is that we might find that any other community could pay very little attention to us. They may have thousands of likely stars to send signals to; as they would not have vast numbers of transmitters, we might receive signals only 1 day in 100 years (and they might have been doing this for thousands of years, of course without result).

This situation is perhaps rather pessimistic, because in fact a much better way for any community to explore is not to send signals, but to send unmanned space-ships, or "probes". These would be loaded with computers and recorded material, ready to give us information about them and to record the information we send them. A superior community might be able to spray thousands of such probes into the galaxy with pre-programmed instructions to listen for any radio waves, and "home" on any planet sending them out.

What would such a probe do? It would circle a planet, picking up radio waves. How would it make itself known? This raises another basic problem; how you get people to perceive the unexpected, and not to dismiss it just as interference?

One suggestion which has been made is that the probe would send back a replica of any message it received. This is good technology, because the senders of the signal would probably also be listening on this frequency. There is in fact a case of some long-delayed echoes in a radio transmission investigation about 30 years ago, which have never been explained.

It is entertaining to speculate that they might have been picked up by an exploring probe, which has relayed the information back to its planet, many light-years distant; a further message may be even now on its way to us. (The delay is because, as pointed out earlier, no signal can travel faster than light: so that if a planet is 20 light-years away, it would be 40 years before a response to the first signal was heard.)

IT is worth closing with the question, assuming that the sort of exploring probe I have discussed may come to us one day, should we learn to listen or learn to send? There is already a listening station in the U.S.A. which has searched—without result so far—for intelligible radio waves from some nearby stars.

Listening is exciting work: it has an appeal. Sending information is not so appealing: you can do it for a long time with nothing to show for it. But it seems to me that it might be far more important. It is unlikely that a probe will yield up its stored information unless we interrogate it properly; and we should surely, besides giving information about ourselves, want to ask questions of the advanced communities—such as how to conquer cancer. (For it is worth noting that the interchange of information in this way is an entirely benign activity.)

I think we should spend time and energy on studying how to send, and what to send—to be ready for the opportunity when it comes. For although the probability of success in communicating with alien communities is very small indeed, the probability of success if we do nothing about it is precisely zero.

The above article is the text of an address delivered by Dr. Mercer at the meeting of the British Association for the Advancement of Science, held in Southampton, England, last year.

Modern roads laid across the sands of the Sahara have made possible the exploitation of vast oil deposits. This network of highways will be incorporated into a future Trans-Saharan highway. Here, surveyors plot the line of a new route deep in the desert.

Esso

NEW PATTERNS OF TRANSPORT FOR AFRICA

by W. H. Owens

IN recent years an entirely new pattern of transport has emerged in Africa and Asia where the development of modern communications is a matter of vital concern to the young independent nations. (See "The Great Asian Highway", Unesco Courier, June 1965.)

Future progress and prosperity in these countries will depend primarily on the exchange of materials, goods and services both with their neighbours and with peoples overseas. This means that they must be served by good international road networks, linking the main cities, ports and production areas, and by deep water harbours capable of accommodating large ships and handling all types of cargo with speed and economy.

In the past, the African and Asian transport systems were based principally on the routing of export produce and minerals as directly as possible from their source to shipping points on the coasts. The railways and roads constructed in the days of colonial rule were designed first and foremost for this purpose. Consequently there were no transport links across frontiers between the main centres of neighbouring territories, except where they happened to be provided by natural waterways.

CONT'D ON NEXT PAGE

A big industrial complex is now growing up around Accra, capital of Ghana, thanks to the nearby new port of Tema with its ultra-modern installations, and also to the completion of a great dam across the Volta River. The first two turbines of the Volta hydroelectric installations, which began to operate in August 1965, are now supplying electricity to a wide area. Here, a surveyor signals to his partner on one of Ghana's new construction sites near the Volta River.

G. Gerber-World Bank

NEW PATTERNS OF TRANSPORT *(Cont'd)*

Through jungles and desert wastes

Today the development of new means of transport is strikingly evident in such a region as West Africa, where a large number of former colonial territories have achieved independance since World War II.

Modern industrial plants have been established to process the crops and raw materials from farms, mines and forests, and the various countries are eager to develop reciprocal trade with their neighbours. Such trade can grow and prosper only if there are modern inter-territorial communications.

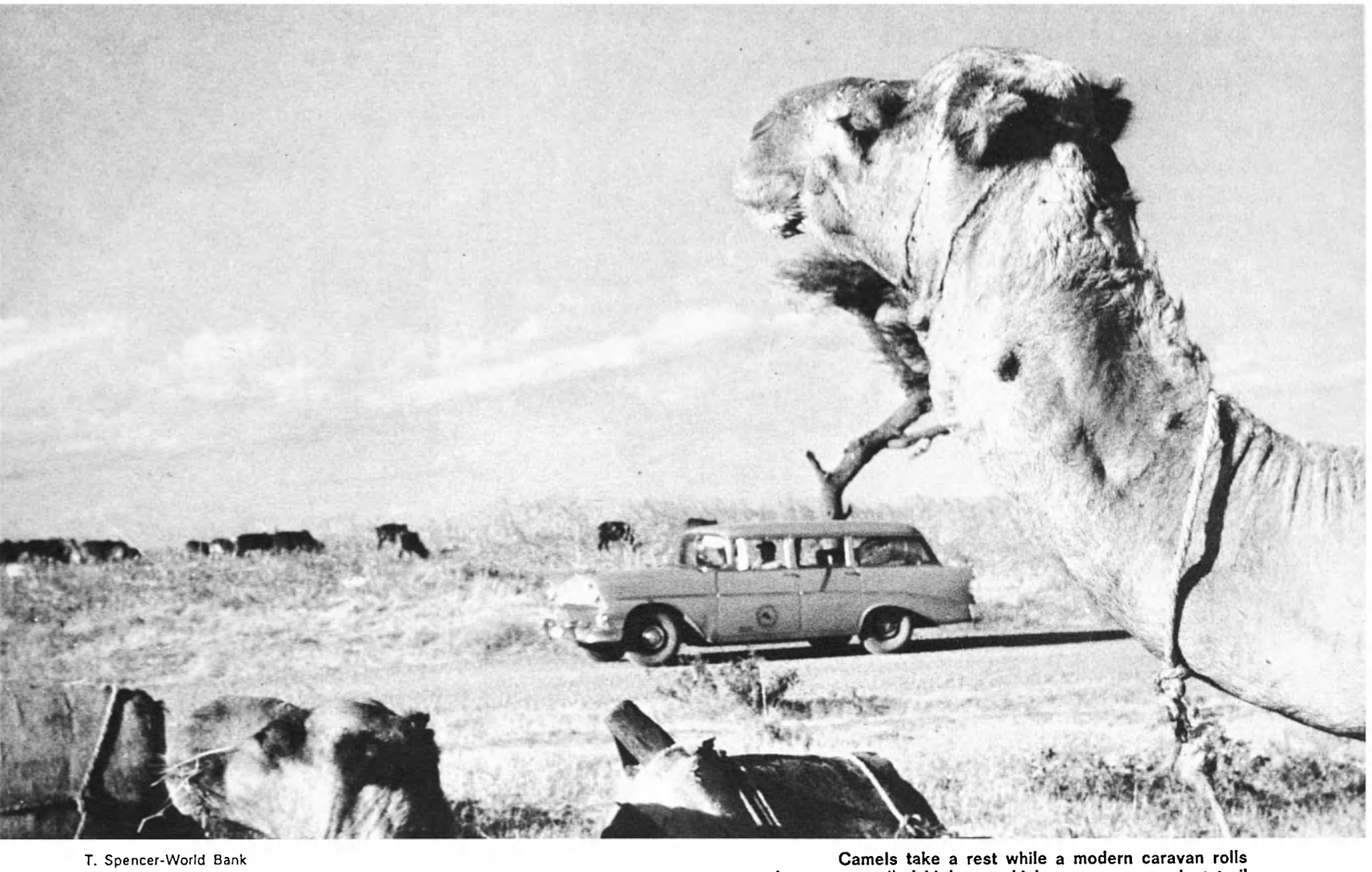
Over the past four years successive conferences have been convened by the U.N. Economic Commission for Africa (ECA) to discuss proposals for building international highway systems to serve the main geographical regions of the continent and provide easy access between them.

At the first meeting of West African Transport and Works Ministers, held at Monrovia (Liberia) in 1961, agreement was reached on the basic routes for a regional highway network of some 14,000 miles. This will link the capital cities and major centres of all territories, reaching east to the Sudan frontier and south to the Congo. Since then, ECA experts have made detailed studies of West African transport problems and the special transport needs of the land-locked countries of the region.

In 1962 ECA sponsored the first East African transport conference at which an international road system for this region, including all countries from Sudan in the north to Mozambique in the south, was agreed to. Economic and technical surveys of alternative routes, particularly over the main existing gap between Khartoum and Nairobi, are now under way.

Both East and West networks will link up at many points, so that eventually it will be possible to drive the width of the continent on continuous metalled roads. Construction of some of the new inter-territorial routes are already under way—for example, the first all-weather highway between the Ivory Coast and Ghana was started early in 1964—but the task is an immense one that will keep highway engineers busy in Africa for a long time ahead.

With the major oil developments in the Sahara, the linking of this vast and potentially rich region to the rest of Africa has assumed growing importance. Desert highway construction has so far been limited to the essential transport needs of the oil and natural gas bases. But a considerable



T. Spencer-World Bank

Camels take a rest while a modern caravan rolls by on a metalled highway which crosses an ancient trail near the Awash River in Ethiopia.

mileage of these modern oil roads—the first ever to be built across the barren desert wastes—will be incorporated in the proposed trans-Saharan Highway which will link the Mediterranean ports of Africa to the interior, and especially the land-locked south Saharan states of Mali, Niger, Chad and Upper Volta.

The trans-Saharan Highway project was discussed by transport specialists from ten African countries at an ECA conference held at Algiers in May, 1964. Agreement was reached on a north-south route through the heart of the desert to join up with the road network of West Africa. This would take the form of an inverted letter Y on the map, stretching south from the Mediterranean coast at Algiers, via El Golea and In Salah, to Tamanrasset in the Hoggar mountains.

From Tamanrasset there would be two branches; one to Gao, in Mali, which could be extended through Upper Volta to Ghana; the other to Agades, in Niger, which would join up with the trunk road system of Nigeria. There would also be two feeder roads at the Mediterranean end, one from Morocco and one from Tunisia, both joining the main trans-Saharan route at Tamanrasset.

A four-nation committee, consisting of Algeria, Tunisia, Mali and Niger, is now studying the plans for this great highway project which, at a conservative estimate, will cost in the region of $126 million.

Delegates to all recent African transport conferences have stressed the need for standardization, not only as regards road and bridge design but in such matters as vehicle legislation, traffic signalling and safety devices, and the classification of through highway routes.

Another problem being studied is the simplification of existing frontier formalities—or where possible, their abolition. Without such reforms the immense value of the international roads to future trade and tourism in Africa could be seriously jeopardized.

Both African and Asian countries alike are too poor to finance these urgently needed highways from their own resources. So help is being provided on a generous scale through agencies such as the U.N. Special Development Fund and the World Bank. The World Bank has already produced loans of well over a thousand million dollars for highway development in nearly thirty countries, and most of this vast sum has been invested over the past five years. It has also sponsored transport surveys in India, Burma, Nigeria and other countries.

Several important African highway projects are included in the twelfth annual programme of the U.N. Special Fund,

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Latest innovation: the 'portless port'

which was approved by its governing council in January, 1965. Among these projects are a study of highway development in Western Nigeria, the development of the highway system in Somalia, and a transport survey of the southern regions of the Central African Republic and Cameroon. The Special Fund provides for the services of consulting firms, experts, technicians and whatever equipment is required.

Modern ports must also play a key role in the economic development of the emergent countries. Significantly, routes between ports and land-locked countries have high priority in the international highway programmes both of Africa and Southern Asia.

Until quite recently there were very few modern deep-water harbours able to accommodate ocean-going ships around the African coastline. Apart from the ports of South Africa and the Mediterranean coast, most of the maritime trade was handled at the numerous surf ports which had served the African peoples for centuries.

Overseas vessels which called at these surf ports had to anchor out in the roadstead while fleets of the traditional paddle craft carried the goods in relays between ship and shore. Quite obviously such an out-of date method has proved increasingly uneconomic in modern times, and as trade grew so did the delays to shipping.

IN the years following World War II, queues of ocean-going ships might be seen off the African surf ports awaiting their turn to discharge or load cargoes. Since then, however, the principal harbours on the east and west coasts have been dredged and deepened. Concrete wharves with modern cargo transit sheds have been constructed to allow the direct berthing of deep-draft vessels, and electric cranes and other mechanized handling appliances have been progressively installed. As a result of the greatly improved rate of ship turn-round, overseas trade at these harbours has increased rapidly.

The most important single maritime development in Africa during the past decade is Ghana's great new port of Tema, which has replaced the surf port of Accra a few miles away. Tema was officially opened in February, 1962, by President Kwame Nkrumah, who described the 80 million-dollar project as "a signpost to the future" for his country.

Eastern Ghana now has a first-class modern seaport for handling large ships and all types of cargo—a facility which will assist the country's development. Without it, the famous Volta River Project—Ghana's largest single economic undertaking—could never have been started at all.

Tema Harbour is nearly one mile in circumference and, with a water area of about 500 acres, is the largest man-made harbour around the African coastline. Eventually there will be twenty deep water berths for shipping and the port can handle up to a million tons of dry cargoes annually. There is a separate oil berth for ocean super-tankers of up to 35,000 tons.

The benefits of this new African port are not to be confined to Ghana alone. Through the developing international highways, other states in the region will be able to share its advantages and thereby develop overseas trade for the good of all. The extensive river systems of West Africa will play their part too. These are capable of great development as low-cost transport routes to serve the communities of the hinterland a long way from the coast.

A NEW CITY has risen at Nuadibu (formerly Port-Etienne) where the western tip of the Sahara desert meets the Atlantic coast of Mauritania. The building of port installations and a railway has led to the exploitation of one of the world's largest iron-ore deposits 400 miles (600 km) distant in the desert. In 1960, the World Bank lent $66 million for the development of this vast mining operation.

E H. Dean-World Bank

One of the real handicaps to maritime development in the poorer countries of the world are the high costs both of building and operating a modern deep-water harbour. There is also an acute shortage of the various skills required to run a complex enterprise of this kind.

These and other problems would suggest, perhaps, that the conventional type of seaport may not after all be the one best suited to the future needs of the emergent nations. The new trend of carrying cargo in bulk, and the ocean transport of goods in pre-packed containers, is already

making some of the long established operations at the world's docksides obsolete. In other words, many activities which are at present carried on in the vicinity of a ship's berthing place could be done with much greater economy in the areas to which most of the cargo is consigned or where it originated.

One of the most interesting developments which could perhaps help to solve port problems in many developing countries is the offshore berthing platform, or loading tower—a conception which has been described, paradoxically, as the "portless port". Linking a ship with the store, and so to the connecting roads or railways, in the simplest possible way gives such installations great flexibility.

For example, they can be set up as a shipping point as close as possible to newly exploited sources of raw materials, and so reduce the cost of building long stretches of link roads or railways and of transport operations along these. Offshore platforms can be adapted for handling all types of ships and cargoes.

Although the emergent nations of Africa and the Far East have many obstacles to overcome as they developed their land and sea communications, they do also have the advantages of an age of unprecedented technical and scientific progress and international co-operation. All the latest technical advances in every field of transportation, together with the means of financing them, are being made available to these young and advancing countries through the various specialist agencies of the United Nations.

The seventh centenary of the birth of Dante in 1265 was marked last year by celebrations the world over. In Paris, at the end of two sessions of round table discussions led by Professor Vittore Branca of the University of Padua, Unesco organized a special commemorative ceremony on the evening of October 28 to honour the great poet. In the presence of the Minister of Education of Italy, Mr. Luigi Gui, leading personalities of the world of letters paid tribute to the work of Dante and his continuing influence across the ages: Marcel Brion of the Académie Française spoke of four famous illustrators of Dante (Botticelli, Blake, Doré and Dali); the Italian poet Eugenio Montale spoke on "Dante, Yesterday and Today"; Ilya Ehrenburg on "The Poet's Universality". and Mary McCarthy on "Dante's Paradise and the New World". "If Dante seems so close to us today," Unesco's Director-General, René Maheu, said in an introductory address, "it is partly perhaps because like our own generation, he lived in a time of wars, fratricidal strife and persecution. What we particularly admire in Dante is that amid the upheavals he lived through he maintained an unswerving faith in man, and succeeded, misfortunes and calamities notwithstanding, in upholding the universal values which all men at heart hold dear." And as Eugenio Montale pointed out: "Dante is the only great European poet of medieval times whose words have remained alive and meaningful even to those without special literary training." It is precisely this universality of Dante's writings and his relevance to our times that Ilya Ehrenburg stressed in his address, the most salient passages of which are reproduced below.

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FOUR FACES OF DANTE

1. By Orcagna (first half of the 14th century), in the church of Santa Maria Novella, Florence.

2. By Giotto (1266-1337). Bargello Museum, Florence.

3. By Raphael (1483-1520). Detail of "The Dispute of the Holy Sacrament", Vatican City.

4. By Luca Signorelli (1445-1523). Kupferstich Kabinett, Berlin.

Photos Guidotti, Rome

DANTE the primacy of poetry

by Ilya Ehrenburg

The greatness of Dante is evident, if only from the enthusiasm his work arouses in every part of our disunited world, whether among the inhabitants of inferno, real or imaginary, among those who do not regard themselves as living in purgatory, or among the illusory shades of paradise.

Reading is an act of creation: every reader of the *Divine Comedy* brings to Dante's text something of himself —a fragment, as it were, of his century. There are thousands of commentaries lined up on the library shelves. Dante is transformed into the hero of his own *Comedy* and is written about as freely as Hamlet is, or Don Quixote. Some represent him as a gloomy Scholastic, others as an impassioned subversive figure bent on the demolition of various dogmas, others again as a visionary sage whom the Popes, by some oversight, failed to admit to the company of the saints.

Dante Alighieri dreamed of posthumous fame, nor was he mistaken. Never has he been forgotten, except during a period which considered poetry in bad taste; and in 1757, when the Italian Bottinelli wrote slightingly of the *Divine Comedy*, Voltaire declared that he admired his daring in calling Dante a madman, and his poem a monstrosity.

With the advent of romanticism the curtain rose anew on poetry, and Dante's *Comedy* was "re-discovered". Goethe, Novalis, Byron, Shelley and Pushkin, found it an inspiration.

A torrent of commentaries poured forth. One book in particular, published in the middle of the 19th century, and dedicated to Pope Pius VII, intrigues me. The author, a devout Catholic, was a certain Eugène Aroux, and the very title—"Dante, heretic, revolutionary and socialist"—bears witness to the exuberance of his imagination. But this is an exception. Most commentators, while disputing amongst themselves, endeavoured to claim Dante for their own faction; Catholics, atheists, royalists and republicans alike proclaimed him one of themselves.

The controversy did not die. Those engaged in it were not, for the most part, lovers of poetry, but Scholastics of all persuasions. The end of the 13th century and the beginning of the 14th was a period of transition, which can be called either the late Middle Ages or else the dawn of the Renaissance; thus it is easy to represent Dante looking to the past or to the future.

The French historian, Jacques Le Goff, in his recent book "La Civilisation de l'Occident médiéval" (medieval western civilization), calls the *Divine Comedy* a sublime poetical summing up of medieval learning and mentality, but one turned wholly towards the past; a magnificent monument of "reaction". At the same time, dozens of other literary historians and critics, compatriots and contemporaries of Le Goff, describe Dante as a "humanist", a "philosopher of the Renaissance" and "the father of individualistic poetry".

SOUL IN TORMENT. Drawing by the French sculptor, Auguste Rodin.
Guidotti, Rome

In Soviet literature, we find similar polemics going on. In the 1920s, Vladimir Fritshe, one of the popular exponents of Marxism, flatly called Dante "an imperialist in the medieval sense of the term"—a judgement which was contested by Anatole Lunacharsky, who considered Dante "the greatest poet of the early Renaissance." In 1965, a literary critic and poet wrote that students of Dante in the Soviet Union are interested in him mainly as a "political thinker and a moralist"; yet a young Soviet political thinker and moralist has written an essay on the complexity, profundity and power of Dante—as a poet.

If I have noted all these disputes, past and present, it is not because I myself intend to stick a new label on his portrait, or classify him in any particular category. (Although Giotto, who knew him, has left us a portrait of Dante, I do not believe it is a true likeness: Giotto doubtless protrayed Dante in the same arbitrary terms as Dante described Beatrice. All that remains is Raphael's conventional profile of Dante, and the same description of him occurs again and again even in Alexander Blok's poem—"the shade of Dante, with the aquiline profile." Not a word about his face, only the nose resembling an eagle's beak: a convention. Pushkin speaks of "austere Dante"; Valery Bryusov calls him a "sombre hero of bygone years".)

I have referred to the thousands of commentaries, the controversies, past and present, simply as a pretext for speaking about Dante, not as a specialist but merely as a reader and a writer of the mid-20th century. Need I say that I am drawn to Dante as a poet, and as a poet alone? We look at the paintings of Leonardo da Vinci for the aesthetic experience and visual pleasure, without reference to his work on engineering or anatomy: as we read *Faust*, we do not think of Goethe's studies on colour.

What interests me in Dante is not the feuds between Guelphs, Blacks and Whites, not Pope Boniface VIII,

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ILYA EHRENBURG *is a world-famous Soviet writer and poet whose works have been translated in 60 languages. Among his works in English are "The Fall of Paris" (1942); "The Thaw" (1956) and "People and Life" (1962).*

not what Dante knew about compasses or his ideas on geometry, Euclidean or non-Euclidean; not his dream of a universal monarchy, his conception of celestial perfection nor any of the many other subjects about which all the Dante experts in the world, including some in my own country, have written and are still writing. I believe in the force and vitality of poetry and, though Dante's learning is out-dated, his sentiments, true to the eternal laws of art, are still abundantly alive, and have the power to kindle our imagination.

Croce the philosopher, the poets Eliot and Saint John Perse, the Soviet poets, Ossip Mandelshtam, Anna Akhmatova and Zabolotsky, have all praised the poetic intensity of the *Divine Comedy*. Dante himself thought it unlikely his work could be translated, and he was no doubt right.

Each generation has its own approach, and each reads Dante's *Comedy* in its own way. I would like to speak of what our generation finds most remarkable in the work of the great Florentine, as corresponding to our own excursions into inferno, purgatory and paradise.

The first point I shall make is that he was not impartial; for this is something for which we Soviet writers have all too often been criticized. The term "committed" is applied to our poets with just a suggestion of mockery, and it is alleged to account for the failure of Soviet literature in the past forty years or so to attain the heights reached by the great Russian writers of the last century. But this explanation is not valid.

I have had occasion to quote many writers who far from being hampered by their lack of impartiality, on the contrary found it an inspiration—as in the case of Stendhal, Dostoevsky and many others.

But the best example of this is Dante himself. Not only did he not eschew politics: for long years of his life, indeed, he lived for politics, and it was on this account that he suffered exile:

> *"Thou shalt make trial of how salt doth taste another's bread, and how hard the path to descend and mount upon another's stair" (Paradise, XVII 58-61).*

It was during the years of struggle that the *Divine Comedy* was begun.

Alighieri still continued to negotiate with other émigrés, the White Guelphs but, disillusioned, he turned increas-

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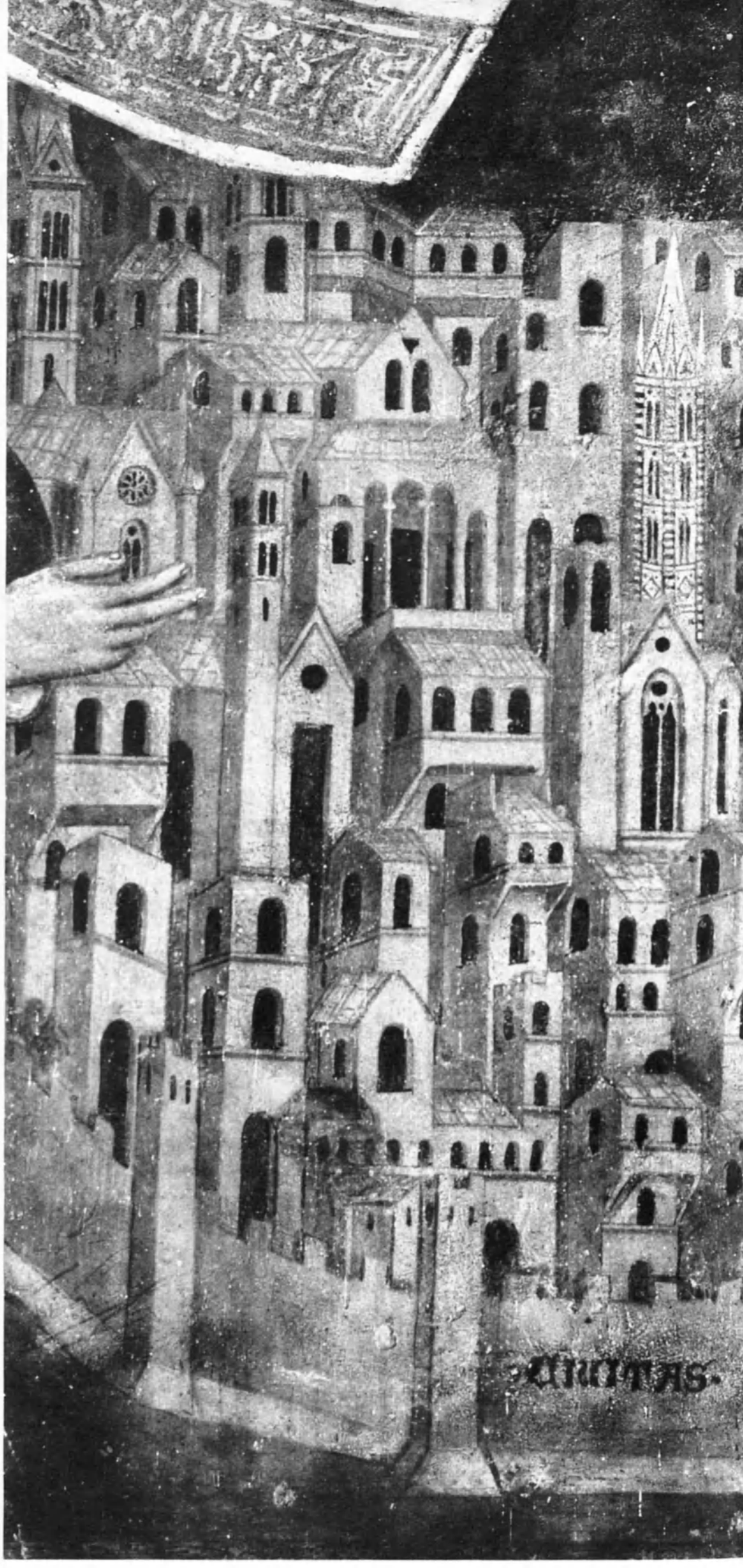


DANTE'S FLORENCE

Florence as it appeared in the time of Dante. Detail of a 14th century fresco, "Our Lady of Mercy", in the Loggia del Bigallo, Florence.
© Giraudon-Alinari, Paris

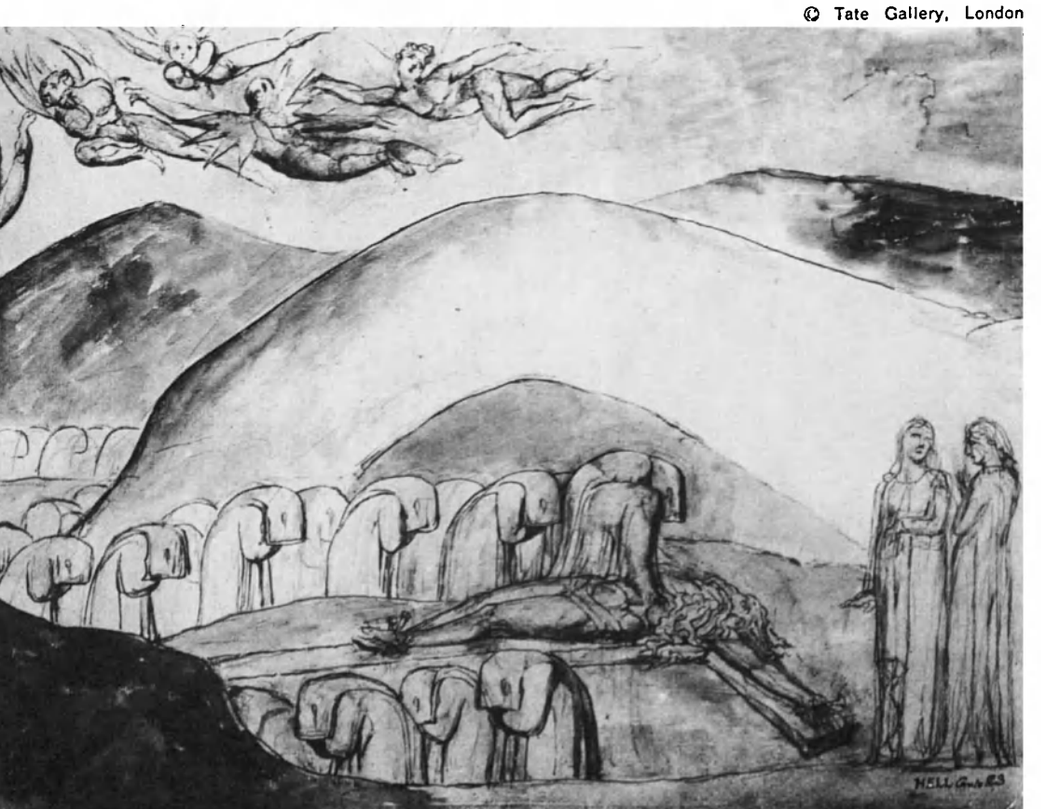
FLORENTINE

FAMOUS ILLUSTRATORS OF THE 'DIVINE COMEDY'

Below left, an angel of paradise, drawn by the Spanish painter Salvador Dali (1950). Right, illustration by the Italian painter, Giorgio de Chirico, for the first Canto of the Inferno, in which the poet relates his encounter with three wild beasts. Bottom, "The Hypocrites with Caiaphas", a water colour by the English poet and painter, William Blake (1757-1827). illustrating the 23rd Canto of the Inferno.

Photos Guidotti, Rome

© Tate Gallery, London



'Masterpieces are born eternal'

ingly towards the Ghibellines, hoping for the intervention of Henry VII. In short, he never turned his back on politics, and the *Divine Comedy* is suffused with political passion.

And Dante's partiality not only helped him to write the *Comedy*; it infused many a canto with passion and vitality. But who nowadays is really interested in the struggle between the Guelphs and the Ghibellines, except perhaps the Dante specialists who, though they have devoted their entire lives to studies of the poet, nevertheless miss the very essence of his poetry?

What degrades art is not tendentiousness, but the tendency to adulterate the essence of art. It is often salutary to recall the old adage that there is no point in using a violin for knocking in nails with, if only because it is better to use a hammer and because violins may come in useful on other occasions. Stendhal, who was as committed as any man could be, scribbled the following note in the margin of his manuscript of *Lucien Leuwen:* " I must be careful not to let the man of politics eclipse the man of passion. The man of politics will be gone fifty years from now. All we need of him is what history finally judges interesting."

Dante succeeded in writing a poem which still stirs the hearts of its readers not merely fifty, but six hundred and fifty years afterwards. What interests us are not the causes of the feuds, but the passions involved.

I wanted to make this point because there are many purists whose criticism, just or unjust, of modern writers labelled "committed", is based on these grounds alone. Yet the fact of expounding a cause has not prevented my contemporarles Mayakovsky, Eluard, Brecht, Aragon and Pablo Neruda from becoming great poets.

One of the questions of interest to us today is that of the realism of Dante, the poet. The word "realism" may sometimes sound a trifle abstract, like the use of numbers in the *Divine Comedy;* it is disparaged or lauded, anathematized or sanctified, by turn.

As Beatrice leads Dante towards Paradise, he contemplates the souls of the blessed—a drawing by the Italian painter, Sandro Botticelli (1444-1510). At Unesco's commemoration of the seventh centenary of Dante's birth, Marcel Brion, the French author, analyzed the different ways in which great artists have illustrated the "Divine Comedy." Botticelli, in his view, was Dante's most faithful interpreter, and conceived his drawings "like the schema for a moving picture, five centuries before that art form was invented."

Guidotti, Rome

I would like first of all to point out the error of certain historians who treat changes in artistic forms in the same way as if they were dealing with social progress or developments in the exact sciences.

Stendhal, in his book on Italian painting, describes Giotto as a clumsy precursor of the great art of the Renaissance. Such was the generally accepted view during the first decades of the 19th century. Then came the time when the merits of the Quattrocento were recognized. First, people became enamoured of Botticelli ; then later Masaccio was "discovered" and it is now claimed that the work of this artist, who died young, contains all the seeds of modern painting. The same cannot, I think, be said of Raphael But does this make his frescoes any the less perfect?

THE attitude to the painters of the past varies according to the particular tastes and aspirations of every epoch. Is Giotto to be labelled primitive because he lacked the eclectic academic skill of Guido Reni? What Giotto had to express was very different from the learning and the canons of the 17th century. Can the simplified forms of Picasso and Braque be attributed to inability to depict the universe in terms of a series of colour photographs?

The Western world was evolving, the knowledge of geography, physics and astronomy expanding. In the 13th century, the sculptors working on the Gothic cathedrals produced an encyclopedia, in plastic form, of the learning of their age, so that some of the figures in their bas reliefs may make us smile. For all that, these sculptors were no less skilled, indeed they were more so, than many of those working in the second half of the present century.

Victor Hugo once wrote that science progresses constantly by a felicitous process of self-cancellation. Science, he said, is a ladder ; poetry a winged flight... Masterpieces are born eternal. Dante does not cancel out Homer. Hugo knew that the Earth revolves. Our contemporaries have learned that infinity is not an abstract conception, but a reality. This invalidates Dante's cosmogony and cosmography, but detracts nothing from his poetry.

Realism in art stems from the feeling of real life, nature and man; and in this sense Dante, like all true artists, was certainly a realist. We read his *Divine Comedy* with supreme interest even though the symbolism of numbers, the sanctity of the divers dogmas and Dante's dreams of a peaceful and just monarchy leave us cold.

The picture Dante draws not only of inferno and purgatory but of paradise as well is based on the image of the Earth, on all that he himself has seen and lived through. It is true that the scenes he describes are drawn from fantasy, but is not fantasy, after all, part and parcel of the real world of man? Are not Gogol's "The Overcoat" and Kafka's "The Trial" in their way realistic?

Dante's vision, permeating both the spiritual nature of the poet and the purpose of the *Divine Comedy,* may be described as realistic fantasy. Goya was endowed with stupendous fantasy, and his war scenes have nothing in common with the battle pictures painted by his contemporaries. But Picasso, in his "Guernica" gave us something different—a foreboding of Hiroshima. Dante, wandering through the world beyond the grave, has constantly before his eyes familiar scenes from life on Earth. He is a living person among the shades of the dead...

Dante is a humanist and a realist; but he is, first and foremost, a great poet capable of transcending the bounds of both Christian dogma and naive realism. We have perforce to forgive him the incident of the discovery of a second, unknown world, for which Ulysses was so cruelly punished; and must accept the fact that Dante spent his life straying not only through the streets of Italy, but also through the subterranean maze of obscure emotions.

In purgatory, Dante meets the singer Casella, whom he knew and loved on Earth; and begs him timidly:

"If a new law take not from thee
memory or skill in that song of love
which was wont to calm my every desire,
may it please thee therewith to solace awhile my soul..."
(Purgatory II, 106-109).

Whereupon Casella sings the love song from Dante's *Convivio* and the dwellers in purgatory, together with Dante and even the wise Virgil, listen enchanted until the guardian of the lost souls, Cato of Utica, the Stoic, who slew himself with his own sword after the defeat of the republican party, hustles up to chide the shades entranced by the sweet strains... "What is this, ye laggard spirits?... Haste to the mount". And drives them back to their task.

WHAT now remains of the feud between Guelphs and Ghibellines, the religious dogmas, and the doctrines of Aristotle or Plato? Dante's *Divine Comedy* itself, the power and the music of his poetry —with all due deference to Cato of Utica and his like.

Historians have indeed a difficult task. We feast on the miraculous apples, while they have to analyse the soil from which the apple-trees sprang.

The *Divine Comedy* ends with the famous line :

"...The Love that moves the Sun and the other stars".

Every child now knows that Dante was wrong in thinking that the Sun and the other heavenly bodies revolve round the Earth; but every modern man with a spark of humanity in him knows in his heart that Dante was right, and that love indeed moves the Sun and the other heavenly bodies, including this planet, not very large it is true, but important none the less, the one which we call the Earth.

THE ROOTS OF PEACE

by Bert V. A. Röling

A new expression has entered the language in recent years: "peace research". Peace research deals not only with intentional war, but also with unintentional war (war as a traffic accident) and civil war. The growing interest in this new activity is conditioned by the nuclear arms situation which calls for a fundamental change in the traditional organization of international relations Unesco is helping to promote the peace research movement, and gave its support to the first international conference of the International Peace Research Association, which took place in Groningen (Netherlands) in July 1965. This year, Unesco is sponsoring a series of studies on the economic and legal aspects of disarmament. Three inquiries into the social and economic consequences of disarmament will later be carried out under Unesco auspices in the Federal Republic of Germany, U.S.A. and U.S.S.R. Readers' attention is drawn to a recent issue of Unesco's quarterly, International Social Science Journal, devoted to Peace Research (Vol. XVII, No. 3, 1965)* The complete text of the article below can be found in that issue.

(*) Single issue : 10/-(stg.), $2.00. Yearly subscription : 35/-(stg.), $7.00.

THE term "peace research" is comparatively recent, as is the scientific interest in questions of war and peace which is emerging all over the world. This new interest is not surprising. It is linked up with the changes in the nature and dangerousness of war. Through these changes it has become possible, as is now realized, for our technically highly developed culture to be brought to ruin by its technology, through war.

There has always been war. An historian has calculated that in 3,400 years of known history there have been 234 years without a known war. A French sociologist, Gaston Bouthoul, has written a book entitled "8,000 Peace Treaties." It is understandable enough that people should think that war is unavoidable in view of what human nature is.

This idea of the inevitability of war has been expressed through the ages in the "cycle of war," and is still alive in wide circles of the population. In 1696 "The Beehive," by Francis Daniel Pastorious, described the cycle of war in rhyme: "War begets Poverty, Poverty Peace, then people will traffic and Riches increase. Riches produceth Pride, Pride is War's ground. War begets Poverty, So we go round." It is also understandable that people should have made a virtue of necessity and have come to regard war as a good thing, as the supreme manifestation of humanity, as a cause of progress.

BERT V. A. ROLING *is secretary general of the International Peace Research Association. From 1950 to 1957 he was a member of the Netherlands Delegation to the United Nations General Assembly; he is now professor of international law and director of the Polemological Institute at the University of Groningen (Netherlands).*

This may be surprising, in view of the misery caused by war. But the dead are in their graves, and the cripples are kept more or less in the background when the war is over. The survivors usually regain their prosperity before long. That mankind has been able to thrive and prosper, despite our continual attempts on one another's lives, is not due to the wisdom of our ancestors, but to their ignorance of the possibilities of destruction. We no longer live in such ignorance. Technological evolution has now made total destruction of the adversary possible.

War has changed its character primarily as a result of social changes in the last few centuries. There were times when it was waged with mercenary armies, later with national professional armies. The Napoleonic period saw the development of popular armies: the democratization of war. This also had its effect upon the nature of war; the limited war as waged by professionals had left open the possibility of a certain chivalrousness and a military code of honour. With the advent of the popular armies all this was changed. Churchill rightly asserted: "From the moment Democracy was admitted to, or rather forced itself upon the battlefield, War ceased to be a gentleman's game." It came to be the total war, in which people stood facing each other.

The technical evolution in armaments made this total war totally intolerable. There were revolutionary developments in explosive power, in range and in speed. The destructive power of weapons has become a million times intensified, their range spans the earth, their speed makes defence, effective protection against them, impossible.

From a means of pitting one's strength against another, armaments have become a means of unrestricted mutual

CONT'D ON PAGE 24

Mother and Child.
A sculpture
by Henry Moore.

© From "Mutter und Kind," Migros-Genossenschafts-Bund, Zurich

Military strength and foreign policy

destruction. This makes the total nuclear war an intolerable catastrophe.

But will not this consequence tend to prevent war? The power of the state is political power, and "political power is not a power over nature, or material, or oneself, but over the minds and actions of other men." Will not the result of this enormous military strength be that the adversary will no longer risk war? That is the doctrine of the "deterrent," in which peace is sought through the threat of intolerable destruction. Through the "balance of terror" the intentional thermo-nuclear war certainly is excluded.

Von Clausewitz described war as the continuation of foreign policy by other means: an attempt to achieve through military power what had proved impossible without use of force. Such views are no longer reasonably possible. The thermo-nuclear war is no longer a reasonable means of national policy. Possibly a smaller-scale war could still be considered as such; the "limited war" of nuclear powers or a war waged by ill-armed non-nuclear States. But in both cases there is the danger of "escalation," of intensification because the losing side resorts to ever bigger weapons (military escalation), or because nuclear powers become involved in the struggle for power between smaller states (political escalation).

The thermo-nuclear war, in which the existence of peoples and their cultures is at stake, is only conceivable as a result of accident, miscalculation or escalation, as an unintentional war, as an accident in the hazards of international traffic.

Military strength by its very nature has a great influence on a country's foreign policy. Military strength opens up the possibility of a provocative, reckless foreign policy, of brinkmanship, in the confidence that the opposing side will not respond to the provocative policy with violence.

Only if interests that are considered really vital are affected can the inflexibility be expected which makes a country prepared to protect these interests by all means. But when is inflexibility certain? On this point there is uncertainty.

NATIONAL nuclear armament is already a risky foreign policy. Nuclear armament does prevent an intentional nuclear war, and is as such a factor of peace. But it also leads to reckless international policy, and—in the case of reliable "arms control"—enables a country to engage in "limited war." Because of this it increases the risk of unintentional thermo-nuclear war, and does not ensure the lasting peace which is the vital interest of technically highly developed countries. National armaments do not provide the required national security, since they cannot prevent unintentional war, and cannot protect the civilian population in case of war.

The increasing realization of the danger into which technically highly developed cultures—and possibly all mankind —are being led by their technology is the chief motive for the present interest in peace research.

There is yet another motive. That is the moral aspect of the present military situation. We have to do with weapons of wholesale destruction, and today some of these weapons are aimed at the civilian population, at the great cities. "Counter-city strategy" is an official component of this strategy.

The civilian population as a military target is a comparatively recent phenomenon. It seems that the practices of actual warfare have changed the traditional law of nations, and modern laws of war apparently sanction the destruction of open cities. But such methods of warfare are incompatible with what used to be regarded as the military code of honour: war was fought against soldiers, not against civilians.

THE "counter-city strategy" marks a lowering of this level of warfare. It is clear proof that the world wars did not only destroy material goods, but also spiritual values. But this lowering of moral standards hardly fits in with the great emphasis on human dignity in our culture. This recognition of human dignity is the most characteristic trait of our times, a recognition of dignity "without distinction as to race, sex, language or religion" (Article 1 of the Charter of the United Nations). Weapons of wholesale destruction can hardly be reconciled with such recognition. One may readily concede that they work "without distinction as to race, sex, language or religion." But they are hardly compatible with respect for man and for human life.

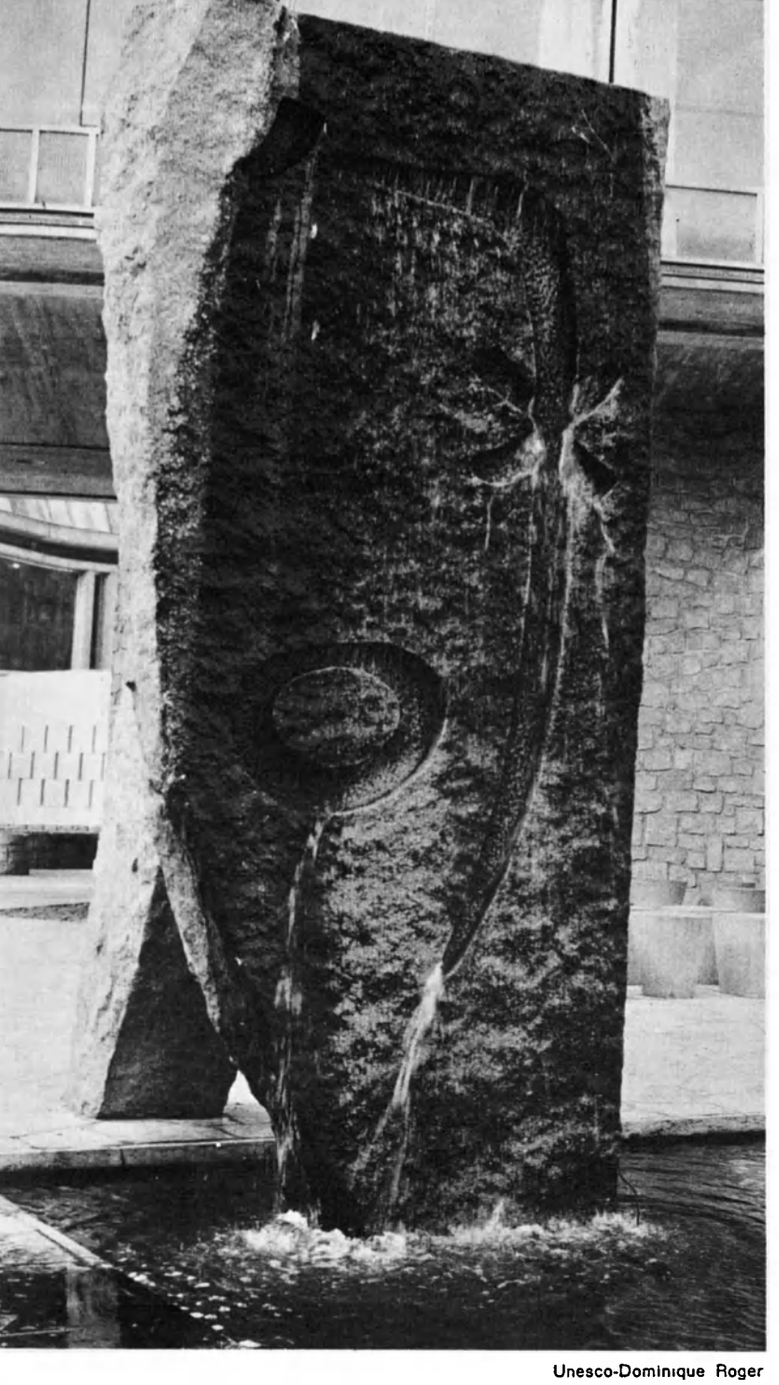
In other respects, too, the "counter-city strategy" runs counter to prevalent views and positive international law. In 1949, the Red Cross conventions, which re-formulated the laws of warfare, were concluded; under these conventions the taking of hostages was expressly forbidden (Article 34, Geneva conventions relative to the protection of civilian persons in time of war). But in the "counter-city strategy" the civilian population as a whole is a hostage for the good conduct of its government. "Hostageship" has not disappeared: indeed it has been extended and democratized!

This paradoxical situation is cited to demonstrate that the arms situation has become morally intolerable, and degrading for the culture in which it appears. The "counter-city strategy" undermines the cultural values which it is supposed to defend.

Many writers have been most outspoken in their condemnation of the weapons of wholesale destruction. The question is, what consequences follow from this condemnation? Unilateral disarmament? Some draw this conclusion. It is the emotionally understandable answer to a situation which is felt to be morally unjustifiable. But it is an extremely unwise answer. It should be realized that the arms situation has grown to what it is now through a process lasting over many centuries.

We must take as our starting-point the situation in which history has placed us: a world grown accustomed to thinking in terms of the balance of power. A sudden disturbance of this pattern might have disastrous effects. The non-disarmed adversary—now unassailable in his power—would no longer be held in check in his foreign policy by the power of his opponent, and would resort to a reckless foreign policy which would be felt as intolerable by the other side. This would very soon result in a tendency towards rearmament. But this again might lead to preventive action. Thus unilateral disarmament might promote war, and encourage the use of nuclear weapons.

The realization that our armaments provide no security, and that they morally undermine our culture, can only lead us to strive for collective disarmament.



Unesco-Dominique Roger

PEACE IN JAPANESE

This Japanese character engraved on the huge fountain-rock in the garden at Unesco's H.Q. signifies "peace". It is derived from an ancient Chinese character depicting a grain stalk (on right) and a mouth (lower left).

General disarmament is no small problem. It can only be achieved very gradually and with great caution. But it is only through this approach that it will be possible to attain lasting peace; and this will involve great changes in the position of the national state and a great strengthening of the world organization which must largely take over its security function.

Complete disarmament under international control, with appropriate provisions to take over the earlier function of threat and violence, confronts the world with unprecedented problems. It will strike at the root of a pattern of life as old as humanity itself. This change cannot be achieved by activity based on intuition. Up to the present day existing peace movements—and how popular they were, especially between the two world wars!—have shown no practical results whatever.

Good intentions are not enough. The catch-phrases of 19th-century peace movements—disarmament and decolonization—as they were given expression in the resolutions of the conferences organized by the Bureau de la Paix were correct. But the question of how such a result could be attained was scarcely put. It would probably have been unattainable then, too.

The Covenant of the League of Nations (Article 8) stated that "the maintenance of peace required disarmament", but this only implied a "reduction of national armaments to the lowest point consistent with national safety". Considering that the preservation of the colonial system was impossible without arms this was an empty phrase, an official truth which came distressingly near common deception.

The nuclear weapons have opened our eyes to the necessity of disarmament. The Charter of the United Nations hardly concerned itself with disarmament. It refers primarily to collective security. But then the Charter dates from the pre-atomic age. Nuclear technology necessitates national disarmament, makes it imperative to change the present system, under which military power is the hard core of relations between States.

This may be required by the actual situation, but how can it be realized? The more one occupies oneself with the problem of disarmament, the more strongly one is impressed by its unprecedented complexity. One is driven to the conclusion that today a good deal of "official truth" is expressed in statements about general complete disarmament, which is not always sincerely meant, and which sometimes serves to mislead the masses.

THE effects of disarmament will be extremely far-reaching. It follows that disarmament can only be achieved very gradually. What are the appropriate first steps? How is the process to proceed? What constructive measures will have to accompany each stage of the breaking-up of the national military machinery?

These are technical, military questions, economic and social problems. But the greatest problems at this point are political ones. They concern the attitudes of governments and of the masses. For the solution of these problems scientific research is indispensable.

The moral rejection of the arms situation, which is primarily based on the existing weapons of mass destruction—but which strikes at the root of the whole traditional military organization—is another motive for the present interest in peace research.

A third motive may be mentioned. History shows us that the size of the political unit in which man seeks protection against enemies from outside has been more or less dependent upon the range and penetration of the existing weapons. The fortress, the town, the county, had to disappear as distinct political units because they could no longer be defended. The range and penetration of modern rockets make the state a unit which can no longer be defended. Even regional groups are no longer capable of such defence. Modern weapons with their world-wide capacity necessitate some form of world-wide organization, which takes over the security function of the states.

The age of nuclear weapons and rockets—an age in which the national state has a greater military potential at its disposal than ever before, but can no longer guar-

CONT'D ON NEXT PAGE

UNESCO ARCHIVES

The science of waging peace

antee security—is also an age in which far-reaching changes must be effected in the current international organization. This is a task which cannot possibly be achieved by statesmen with a short-term policy based on conventional wisdom. The task requires extensive scientific preparation, not only with regard to the system that would eventually have to be established, but also with regard to everything that would be needed to make populations prepared to accept the ultimate goal.

In earlier times, many studies on war were published. Indeed there exist a great many books about the causes of war. They are worth while. But it should be borne in mind that most of these earlier works deal with war as it was understood by Von Clausewitz, that is to say intentional war, and pay little attention to unintentional war, war as a traffic accident.

The old theories often lay the responsibility for war at the door of small groups, such as ambitious kings, warlike generals or profit-seeking arms manufacturers. If one asks after the cause of the unintentional war—and this implies asking after the cause of risky foreign policy —one is more likely to find it in very general factors, current habits of thought and action. It then becomes clear how fatal traditional habits and attitudes can be. The cause of war is closely linked with the existing general situation. All this indicates the democratization of the cause of war.

If this is so, it makes the problem even more difficult. So long as the fault lies with small élite groups, it is possible to attempt to counteract their influence. But if we have to do with attitudes and views which are deeply embedded in the people as a whole, it is so much more difficult to find ways of bringing about conditions for a lasting peace.

It should also be recognized that as yet we know only very little about the factors which lead to risky foreign policies. Here too—as in the problem of the cause of the intentional war—we have to do with a combination of factors originating with the individual, with the state and with the world. Is war unavoidable because man is by nature aggressive? What gives rise to this aggressiveness? Is it an essential component of human life, or a reaction against frustration, or a cultural phenomenon, acquired by imitation and adaptation to an existing pattern? What is the effect of pornography intermingled with violence, of films featuring violence?

And what about the factors in the state? What part is played by public opinion here? How is public opinion formed?

AND what factors govern the relations between states? Are these primarily determined geopolitically? Is overpopulation the all-important factor, as Bouthoul thinks? What part is played by history here? What are the origins of the stereotyped notions that peoples have about one another? Is a disappearance of the general distrust of foreign states possible? Is competition still more profitable than co-operation? And if not, how can the current pattern of competition be modified?

I mention only a few questions. They could be supplemented with hundreds of others. They are mentioned simply to show that many disciplines will have to co-operate to yield some insight: psychology, history, economics, sociology, legal science, and even theology and art history, for the Church and the arts play an important part in attitudes and views held by individuals and groups.

These attitudes and views are of the greatest importance with respect to war and peace. Here, too, it is essential to emphasize, besides the concept of "intentional war", the importance of the "unintentional war." Gradually, there is developing a general feeling against war; there is a growing aversion to war. But this is not yet the case with "risky foreign policies." In the matter of foreign policy, many things are still as they always were: security through national or regional power, and occasional provocation if the other party can be expected to give in out of fear. It is an attitude which gives insufficient attention to the concept of "unintentional war."

IN this context I would briefly note that as war recedes into the background as a result of the arms situation, world organization and war prohibition, civil war acquires greater importance. A civil war is often a limited "war by proxy," in which it is the outsiders who give an originally purely domestic conflict its international aspect, and contribute to its prolongation and intensification. Civil war, too, falls within the scope of the science of war and peace.

What system of world order would have to be set up to prevent (total) war?

What are the requirements that would have to be met by an effective peace policy? What is needed to ensure the safety of international traffic? It stands to reason that sacrifices will have to be made for peace, both in the material and in the spiritual sphere. In the long run war is inevitable if the gap between rich and poor countries continues to widen, as it is now doing. Hence the need for intensive activity to raise the standard of living in the developing countries. It cannot be denied, however, that economic changes in these countries will also entail great social changes, with all the unrest and aggressiveness that go with them.

It is important to arrive gradually at a clear idea of the nature of a disarmed world. It goes without saying that material sacrifices will be necessary. It is easily said that of course peace has its price. But it is not only a matter of material "sacrifices." Concessions will also have to be made in spiritual matters. There will be opposition to overcome for the very reason that the spiritual climate in a disarmed world will necessarily differ from the present climate. This will not tend to make things easier.

The traditional attitude is a facile one which is determined only by the views current in one's own circle, which takes a black-and-white view of right and wrong according to the views prevalent there, and is prepared to risk war for what is felt to be right. A world-wide security system involves entering into a larger whole, a recognition of the right of "foreign" views to exist, an attitude of tolerance towards others, of give-and-take, a willingness to act reasonably and to compromise.

To form an idea of what is needed for maintaining peace is important also because by so doing we make it clear to

CONT'D ON PAGE 31

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THE WHITE BIRD, an etching and aquatint by the French painter, Georges Braque, one of 12 works executed by the artist when he was 80 (in 1962) for a remarkable art book, "The Order of Birds". To accompany the engravings, the French poet and Nobel prizewinner, St. John Perse, wrote a poetical meditation on birds, which he said, "preserve among us like a very pure echo something of the song of creation."

Man through his art

BEAUTY AND THE BEAST

by Pauline Bentley

THROUGHOUT every degree of civilization and beyond the division of time and environment, race or culture, man has always known one perennial link of common experience: his world has been the dwelling place also of animals.

Since his earliest beginnings he has used these sharers of his planet to help him on the long haul of human progress. They have provided him with food and warmth and weapons. He has domesticated them and put them to work for him in peace and war; he has used them in his quest for knowledge and mastery; he has formed societies to protect and hunt them, to study and worship them; there is no facet of his endeavours whether for sport, magic, sustenance or learning that has not been affected by the existence of animals.

During this long and ancient partnership man the artist has also fed his imagination and sought inspiration from the same source. He has taken whatever implement lay to his hand to depict the animals around him and in so doing he has interpreted them not only to himself and us, but left behind a unique personal testimonial.

"It is the achievements in the visual arts that have survived," writes Miss Jacquetta Hawkes, the celebrated archaeologist, "which brings us the first insights into the imaginative lives of our primitive forebears." Miss Hawkes is writing here on the Palaeolithic cave paintings in the Dordogne, France, in the opening chapters of

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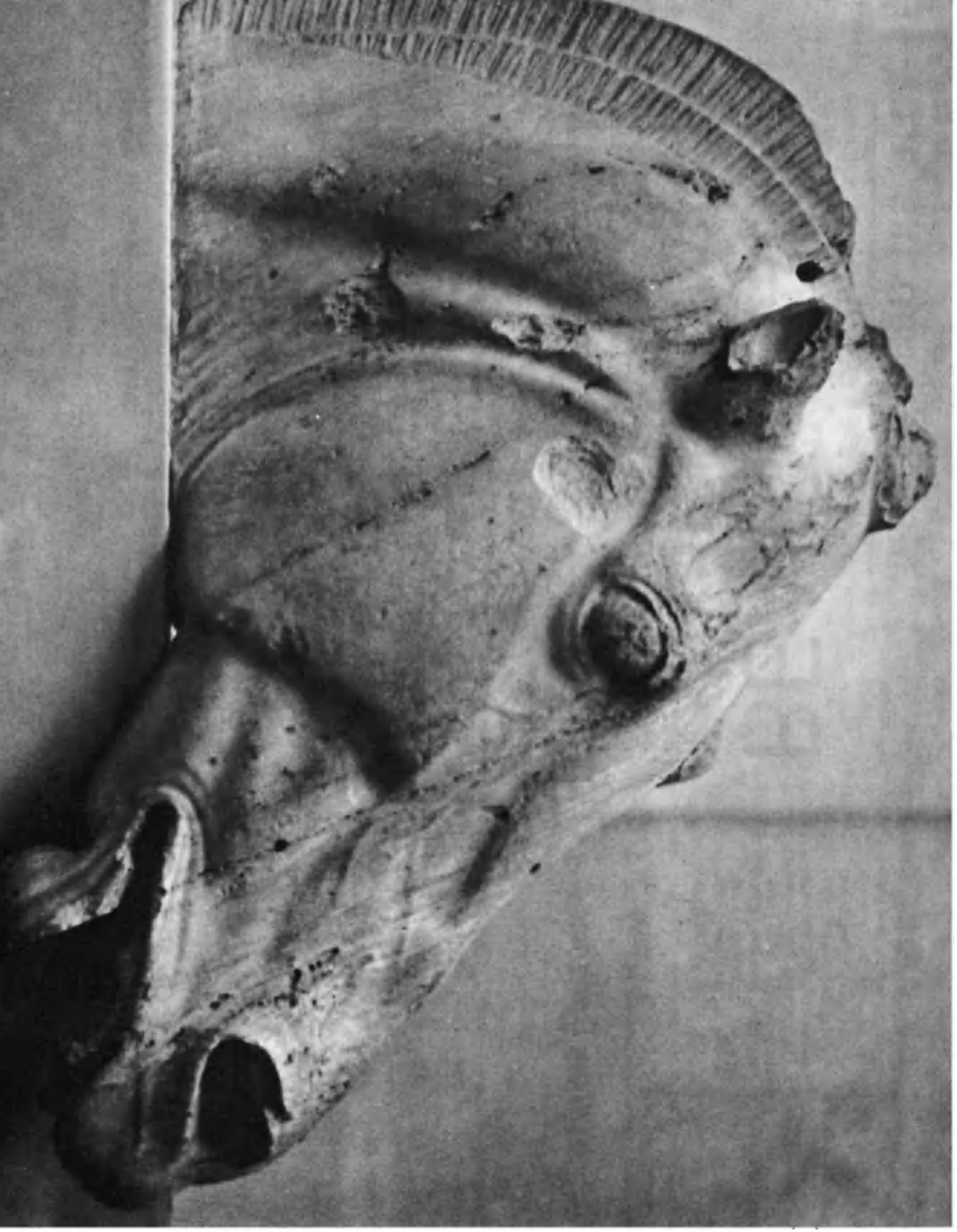

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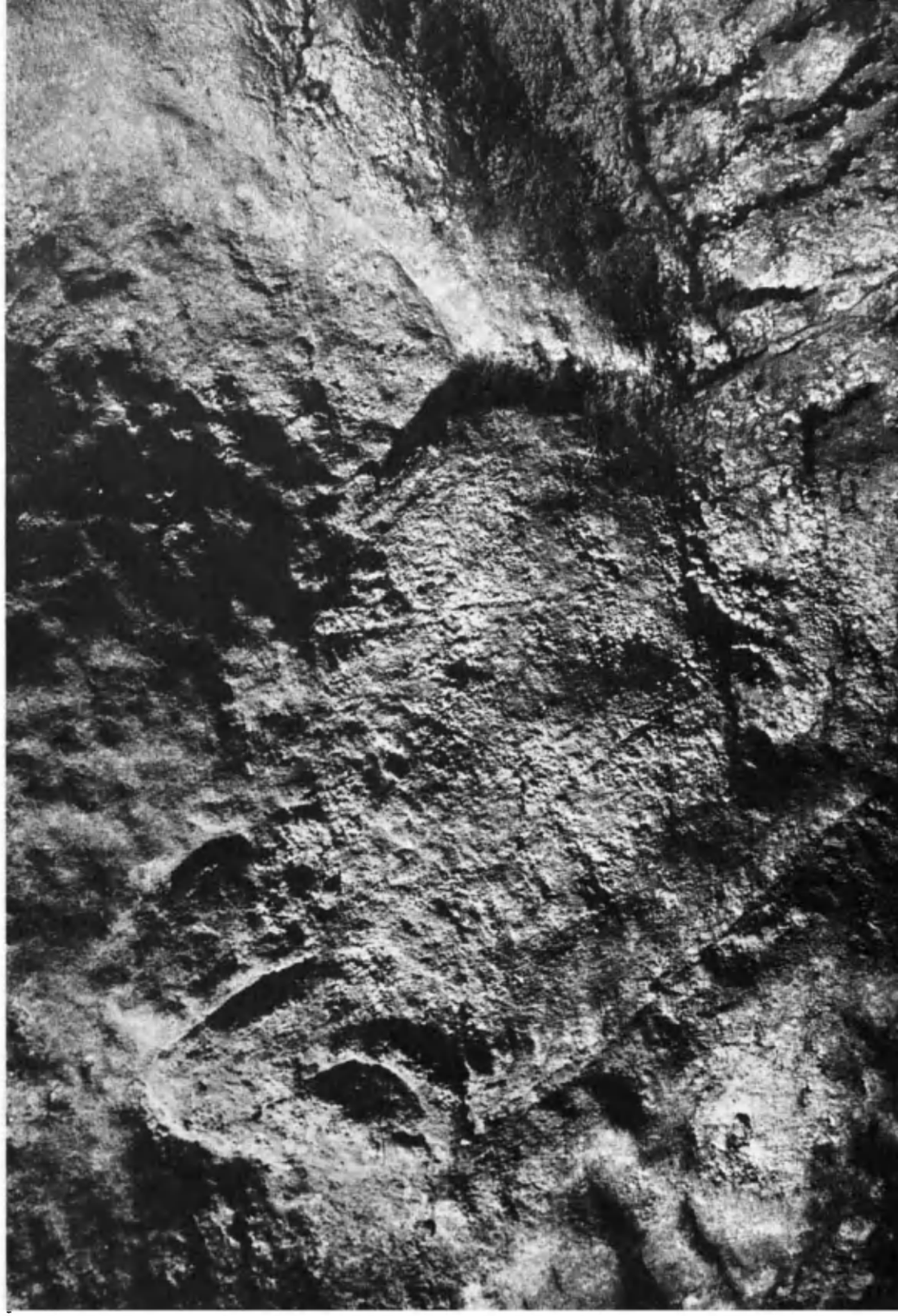

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METAMORPHOSIS OF THE HORSE

In the evolution from prehistory to civilization, man's relationship with animals has been completely transformed. The change is easily distinguished in the way man the artist has depicted his animal subjects, as witness these three horse's head sculptures. Opposite page, top, The Horse of Commarque, in the Dordogne, France. Some 13,000 years before the Christian era, a prehistoric artist used the natural indentation of the rock in a narrow underground gallery to create this wild untamed horse with sensitive nostrils—a horse before its enslavement to man. Bottom, the Moon Horse of the Parthenon frieze in Athens, carved in marble by the 5th century B.C. sculptor, Phidias. Found among the mutilated fragments of the pediment, and now in the British Museum, it is the head of one of the horses attached to the chariot of Selene, goddess of the moon. This is a modern, domesticated animal, completely subjugated by man. Above, head of the bronze equestrian statue of the Colleoni monument in Venice, carved by Andrea Verrocchio in the late 15th century. The gentle, almost pensive head shows that this now docile creature has become a companion to man.

The winged master of the airs

"Man and Animal", the third volume of **"Man Through His Art"** published under the sponsorship of the World Confederation of Organizations of the Teaching Profession with the financial help of Unesco.

This book, with short texts by a group of distinguished scholars from different countries, and illustrated by 16 colour plates and numerous other plates and drawings, gives an outline of animal art throughout the world from primitive to contemporary times.

"The subject of Man and Animal", writes Miss Hawkes of the Lascaux cave paintings, "takes us at one leap to the beginning of all art. The Paleolithic tribesman, like all hunters, were in an ambiguous position in relation to their animals. They felt a strong emotion towards them and accepted the closest kinship with them, yet they had to kill them. Indeed the marvellous animal art might be said to be a kind of propitiary gesture, a wordless statement of admiration."

Man and Animal is the third in the series of a contemplated 15 volume collection of the Man Through His Art albums. Already published: Volume I, War and Peace; Volume II, Music. Forthcoming volumes on Education and Love and Marriage. The volumes should provide teachers with a valuable tool for furthering appreciation of different cultural values. Orders and inquiries from the following addresses: U.K. edition: Educational Productions Ltd., East Ardsley, Wakefield, Yorkshire; school ed. 25/-; general ed. 30/-. Canadian edition: The Queen's Printer, Ottawa, Ont.; general ed. $8.00; school ed. $5.00. U.S. edition: New York Graphic Society, Greenwich, Conn.; general ed. $7.95; school ed. $5.75. For Scandinavia: International Publishing Co., Box 404, Orebro, Sweden; 45 Kr. PLEASE DO NOT SEND ORDERS TO UNESCO.

This kinship was to be transformed as man lost his "direct line" to Nature. The animal dominates prehistoric art but when man came to organize himself into settled communities he first subjugated, then domesticated his animals.

This changed relationship can easily be distinguished in the course of man's artistic treatment of his animal subject. It is far cry from the mystical simplicity of the Lascaux "Horse with Feathered Darts" to the sophisticated deliberation of the "wounded lioness" of an Assyrian hunting stone relief of 1000-612 B.C.

The sculptural splendour of the "Moon Horse" of the Parthenon frieze,

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Imagery of beliefs myths and ideals

as discussed by Professor François Chamoux of the Sorbonne in Paris in this book, is very distant in every aspect except as subject matter, from the Horse of Commarque, a seven foot long relief made some 13,000 years before the Christian era.

Here, an artist largely using the natural indentation of the rock, created what Professor Giedion calls "a well-nigh breathing image, yet one which eludes our grasp. A horse which blooms out of the rock in absolute freedom, a horse before its enslavement to man."

Though Greek classicism saw the apotheosis of man over animal, the artist continued to draw from the animal world his illustrations for his beliefs and history, his myths and ideals. Sixth century Chinese wall paintings in the Tun Huang caves depict the Buddha legend with animals; Coptic weavers of the third to fifth centuries A.D. used the birds and fishes of their familiar river Nile as a theme for decoration. The animal imagery of the middle ages was both extraordinarily powerful and full of humour; the animal in Mexican and African art has a peculiarly potent place.

In the 19th century the French painter, Eugène Delacroix, described in his diary a visit to the Natural History Museum and the Jardin des Plantes in Paris. "What an immense variety of animals and species of different shapes and functions. And at every turn I saw what we call deformity side by side with what seems to us to be beauty and grace of form. Why is it that these things have stirred me so much? I had a feeling of happiness as soon as I entered the place. . . Can it be because I have gone outside the everyday thoughts that are my world; away from the street that is my entire universe? How necessary it is to stick one's head out of doors and try to read from the book of life that has nothing in common with cities and the works of man. . ."

For now there has arisen what Professor Otto von Simson of Die Frei Universitat, Berlin, in his introduction to this book calls "the second alienation from nature—the replacement of the animal by science, by the machine."

The importance of the animal to an artist working in a world where animals are becoming rarer needs no stressing, but scientific progress is no indication that this age-old communion between man and animal need deteriorate. It seems significant that the last creature chosen in the book should be Braque's "White Bird," that winged master of the airs whose flight in man's imagination can bring him within the reaches of new worlds.

© Freer Gallery of Art, Washington D.C.

THE BEAR TAMER. Bronze statuette from China (5th-4th century B.C.) Since ancient times the Chinese have been fond of acrobatic performances by men and animals. Looking at this bear and its youthful tamer, we can easily imagine the delight of an audience at the dexterity of an animal which can be taught to juggle, walk a tight-rope, ride a rolling sphere and also, as the statuette shows, balance itself on top of a pole.

THE ROOTS OF PEACE *(Continued from page 26)*

ourselves how far we are still removed from what is vitally necessary.

Yet even when we have ascertained what is necessary, "necessary for survival," we have still not touched the question whether the necessary will also be attainable. Every community and every generation has only a narrow range of action. Only gradual, small steps can be taken.

This leads to a fourth complex of questions: can the necessary be made possible? The time available is not unlimited. There is a certain urgency. The problem is whether individuals and peoples can be induced—by education and other means—to make "the necessary" possible. Is the "human way" of change through reason and common sense possible? Man is also "irrational man," who in his opinions and actions is primarily swayed by instinct, emotion and tradition. Reason, especially in the human group, has but little influence, and the influence of what is emotionally felt, direct, and immediate, dominates. It has been said that if one wishes to influence the masses, one cannot afford to fly in the face of the "basic attitudes" of nationalism, or freedom, or of security sought through power.

The prevalent pattern of international relations is a pattern of distrust and fear. Can this possibly be changed? Certain fundamental human attitudes "have become so much a part of the mind, and lie so far back, that (men) are never really conscious of them at all. They do not see them, but other things through them." The important question is how far ways can be found to make individuals and peoples prepared to accept what the "long-term interest" of ensuring peace demands.

This ends our brief survey of some questions which determine peace research. To answer them thorough scientific investigation is required in which almost all scientific disciplines must be involved. Close co-operation between these various disciplines will be indispensable.

The problem is a social one, one of individuals and groups, and of contacts between individuals and groups. In such an investigation the starting-point will have to be the present situation, as a product of historical evolution, hardened and intensified by the ideas and interests rooted in it. The historical evolution of each group, which distinguishes it from other groups through the deep-seated memory of shared joys and sufferings, makes it desirable that peace research should primarily be cultivated in each individual political collectivity. Each collectivity has its characteristic peculiarities and idiosyncrasies, each collectivity may have its own ways and possibilities of change.

PEACE research in each state is important also because there is a tendency towards spiritual insulation on certain points, to protect the national pattern of thought.

Peace research in each country will be able to help counteract this nationalization of truth. Research in the social sciences will recognize such nationalization as a fact, but may through this very recognition be able to prevent its worst excesses.

There is another important aspect. If it is true that our world is not organized in such a way as to be equal to the dangers that technological evolution has brought about, then it is imperative that changes should take place. That this is so is beyond doubt, although for the moment we can leave aside the question of what these changes would have to encompass. There is a predominant school of thought which maintains that these changes will have to run on lines of general and complete disarmament, and the ensuring of security through world organization.

This means that the changes will have to be realized everywhere. Security cannot be achieved by unilateral measures, of whatever kind, but only through combined efforts and concerted action. Changes at home will only be possible as adequate steps are taken elsewhere, prompted by a recognition of common long-term interests. Now if it is true that for the realization of the changes required for lasting peace scientific research is indispensable, then it is essential that such research should be carried out everywhere. If peace research is to be effective, the understanding it provides will have to become public property everywhere. This will be promoted by the existence of peace research institutes in every country.

WE have here a consequence of interdependence, which is even more evident than that which led to the establishment of the International Labour Office. Improvements in the social conditions of the labouring class could not be effected nationally without simultaneous implementation elsewhere. Hence the attempt at internationalization of labour legislation in 1919. International security through disarmament can naturally only be attained if the pattern of security through national armament is universally abandoned, and appropriate measures are universally accepted.

The first requirement, therefore, is that peace research should be cultivated in all countries and nations: peace research which can then start from the pecularities of each, historically conditioned, national situation; peace research which can express itself in the specific national pattern of thought, enjoy national confidence, and thus influence national patterns of thought.

The possibility cannot be ruled out, however, that the nationalization of truth will also set its mark on nationally-conducted peace research. Here is a first special reason for the desirability of international contact and co-operation in the science of war and peace.

Another special reason is that peace research deals with matters which affect the whole world, so that it is important to be informed of "the situation" everywhere. It is only through the co-operation of scholars that an understanding may grow of what is thought and felt in various parts of the world, and of what—in a concerted effort to effect changes—represents action possibilities.

In addition to these special reasons for international scientific co-operation there are the general reasons—of mutual stimulation and supplementation—favourable results of which in different fields we can daily see before us.

The need for international contact and co-operation has led to the establishment of the International Peace Research Association. The Association aims to make a substantial contribution to world and international peace research in order to promote world order, peace and security. This will be possible if many are prepared to lend their active support.

Letters to the Editor

LAKE BAIKAL POLLUTION

Sir,

Lake Baikal, as you are certainly aware, is a body of water with unique qualities. It contains one tenth of the total volume of our planet's reserves of fresh water, and its signifiance, for science and for the future of man alike, is immense. Two other unique features of the lake are the physical and chemical qualities of its water and its fauna which comprises over 100 species. Thus it can be considered as part of man's heritage from nature. But a threat hangs over Lake Baikal—its possible pollution by industrial waste waters from the projected pulp and cardboard works at Baikaisk and Selenga that are being built despite protests from scientific circles in the Soviet Union. Several Soviet newspapers have campaigned to warn against the danger of this pollution which could happen within 30 years, thus destroying this pearl of nature together with its fauna. Means must be found to prevent this senseless act.

Vladimir V. Eichwald
P. Lavachov
Tallinn, U.S.S.R

Ed note : *According to recent Soviet press reports the Lake Baikal area is to become a huge national park administered by a special body to supervise the use of its immense natural resources while developing it as a holiday and tourist centre. Special precautions would be taken against possible pollution by industrial wastes. Two plans are being discussed, one for a park with an area of nearly 5,000 square miles (13,000 sq. kms.) and another for a park nearly three times as large.*

YOUTH WITH A PURPOSE

Sir,

In the July-August 1965 issue on youth your staff has come up with another unique journalistic success, not so much dependent on the pictures or the prose or the lay-out, but on the humanity of the whole.

Some particular gems of information and understanding are the facts given about Unesco clubs, the art essay, with its colour pages, much of the part on science, the fascinating essay from the Soviet Union, and—naturally—the concentration on the developing countries. Something which the whole panorama seems to have in common is its rejection of any limitations on man.

Kevin Henly
Clinton, Ontario, Canada

Sir,

I wish to say how glad I was to see the issue on youth. I was interested in the articles published in 1964 on Juvenile Delinquency but could not help wondering at the time—why doesn't someone write about the normal youth ?

These are the people who will be running the world for the next thirty years or so—and they will run it well !

Harry Torr
Canberra, Australia

INTERNATIONAL CO-OPERATION IN UTRECHT

Sir,

The dual celebration of the 20th anniversary of the United Nations and U.N. International Co-operation Year in 1965 was marked in Utrecht (Netherlands) by a huge illuminated sign on the wall of the city's Industries Fair Bulding *(see photo below)*. The sign (14 metres by 36; 46 ft. by 115) was placed there on the initiative of the Unesco Committee at Utrecht.

Fifteen thousand electric bulbs were used to compose a scene showing the clasped hands symbol of International Co-operation Year surrounded by children of different lands. The bulbs were arranged against a colourful blackground so that passers-by were also given a impression of the picture in the daytime.

F.H. Tunnissen
Director
Unesco Centrum Nederland
Amsterdam

THE REVOLUTION IN BOOKS

Sir,

Congratulations on devoting your September 1965 issue to today's revolution in books. After reading about Unesco's latest guide to world translations (Index Translationum) I wish to pass on some figures concerning Bible translations as given in the September 1965 issue of *Ecclesia*. According to this review: "In 1964, sixteen new languages were added to those in which at least one complete book of the scriptures has been translated. Ten of these new languages are spoken by South American Indian tribes, four by African peoples and two by Asian. The complete Bible now exists in 235 languages; the New Testament in 290 and a gospel or another complete book of the scriptures in 707 languages—altogether 1,232 languages. In 1964, the world distribution of the scriptures by bible societies (in millions of copies) was as follows: Bibles 4; New Testaments 4; Gospels 30; Selections 32—a total of 70 million copies."

Abbé Jean-François Pinard
Charleville, France

KORZYBSKI & MARY EDDY

Sir,

As a professional linguist, I have throughout the years noted many mistranslations, some of them rather startling. But never have I come across such a fantastic, unbelievable whopper as in Prof. Zvegintsev's letter in your issue of September 1965.

I have not seen your Russian edition, but I presume that Prof. Zvegintsev wrote in Russian. Accordingly the error must be attributed to your translator.

To confuse "Science and Sanity" by Alfred Korzybski (note the correct spelling of his name) with "Science and Health" by Mary B. Eddy is a monumental blunder. Both Korzybski and Mrs. Eddy must be whirling in their graves.

William A. Coates
University of Rochester
U.S.A.

NATURAL GESTURE

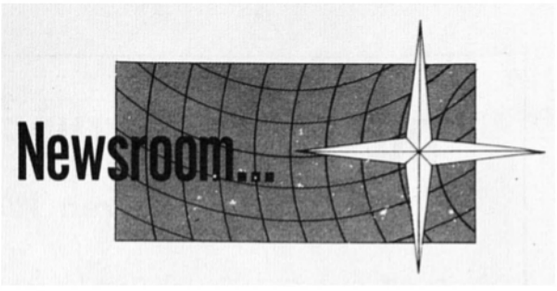
Sir,

I was very touched by the letter in your December issue from a Viet Nam reader who deprived himself of breakfasts in order to subscribe to a magazine which has so much to offer him culturally. I am a schoolgirl, aged 17, and I realize what knowledge costs. So I should like to send him some reading material on science of the kind he would find useful.

I know what the position is like in Viet Nam today and how difficult things are for students because of the political instability. I hope I shall not be the only one to make this, in my view, natural "gesture."

Catherine Collet
Geneva, Switzerland

From the Unesco Newsroom...



Nobel Peace Prize for Unicef

On December 10—Human Rights Day—the United Nations Children's Fund received the Nobel Peace Prize for 1965, an award made in recognition of Unicef's work for the world's children. Since it began with emergency relief work for children in war-stricken countries in 1946, Unicef has extended its activities to include all deprived children, especially in the developing countries of Africa, Asia and Latin America. Today, 571 assistance projects are operating in 118 nations. Since 1961, when Unicef decided to extend its aid to education, joint Unicef-Unesco projects have been started in 55 countries. They run from the education of handicapped children to community development schemes, and from textbook publishing to teacher training.

Unesco books reprinted in 35 languages

Hundreds of books published by Unesco have been reprinted by commercial publishers throughout the world. In the last quarter of 1965 alone, 90 Unesco books were being reprinted in 35 languages. Early publication of 70 more titles is foreseen. Two main types of books are being reproduced: Unesco publications dealing with education, science, social sciences, cultural activities and mass communication; prose and poetry classics of different nations, including folk tales and anthologies which Unesco translates and distributes to make them better known in other countries. Most translated book to date is Unesco's "Source Book for Science Teaching", a "do-it yourself" science book which explains how to do simple experiments with "home-made" equipment; it has already been published in some 30 languages.

Asia's educators look ahead

Educators from 15 Asian countries and the Soviet Union reviewed problems of Asia's future educational growth at the recent conference convened in Bangkok by Unesco and the United Nations Economic Commission for Asia and the Far East. Discussions brought out the need to work for a balanced educational growth at all levels, to expand technical education and launch literacy campaigns, to keep in view the varying levels of educational development in Asian countries and to bring educational development into the economic and social planning of each country. Delegates recommended the introduction of an expanded programme of science teaching at all levels.

Pollution problems of Europe's rivers

The Rhine waters upstream from Lake Constance contain only 30 to 100 microbes per cubic centimetre, but the bacterial count is between 100,000 and 200,000 where the Rhine reaches the sea. Above Paris the Seine contains only 15 pathogenic organisms per cubic centimetre; downstream the figure is roughly 1,500,000. These figures are taken from a report recently presented to the Council of Europe. The Council plans to set up a convention to fight water pollution and also to publish a Water Charter to publicize the problem.

Economic effects of disarmament

"The Economic Effects of Disarmament", a detailed study of the effect of disarmament on the British economy, first published in 1963, is now available in a special paperback edition, price 12/6. Published by The Economist Intelligence Unit, 27 St. James Place, London S.W.1., the study shows the types of industrial capacity and manpower which are now absorbed by defence, the policies needed for their conversion, and the type of peaceful expenditure that might replace military expenditure.

Versatile isotopes

Jobs now being done by radioisotope instruments range from sorting the mail to helping in the salvage of the Abu Simbel temples in Nubia. A recent symposium of the International Atomic Energy Agency held in Warsaw was told that in France zinc is added to the paper used for making stamps so that X-rays can detect the stamp's position on a letter. This enables the first phase of mail sorting—straightening out envelopes and turning them face up—to be done at the rate of 400,000 letters an hour. At Abu Simbel, isotopes trace the injection of resin as a reinforcement into the rock walls of the temples before they are cut into blocks for removal. When the injected resin approaches the surface of the rock to the point where it might mar it, isotopes sound a warning.

Stop using the sea as a junk yard and sewer

Man can no longer consider the sea as a convenient and apparently limitless combination of junkyard and sewer. If this process continues, unplanned and uncontrolled, man may pollute and destroy large areas of the sea and its resources just as he has polluted and destroyed land. Domestic sewage is rapidly broken down by microorganisms in the sea, but crude oil, radioactive wastes, heavy metals and chlorinated hydrocarbons used as insecticides are not disposed of by biological processes. DDT has been found in tunny fish caught 400 miles offshore and other pesticides in penguins in the Antarctic. This warning against pollution was given by the Unesco-sponsored Intergovernmental Oceanographic Commission at its recent meeting in Paris. The Commission urged its 50 mem-

CONT'D ON NEXT PAGE

BOOKSHELF

UNESCO TRANSLATIONS OF THE LITERATURE OF ASIA

Books listed below have been accepted in the Asian Literature Translations Series of Unesco. They are recommended as highly readable and representative of the literature of the country of origin.

■ **Poems of the Late T'ang.**
An anthology of seven Chinese poets of the 8th and 9th centuries A.D. Penguin Books, U.K., U.S.A., Australia (4/-).

■ **Letters of a Javanese Princess.**
Writings of Raden Adjeng Kartini who became an Indonesian national heroine. W.W. Norton & Co., New York ($1.95).

■ **Su Tung-P'o.**
Selections from the greatest poet of China's Sung dynasty (960-1279). Columbia University Press, London & New York ($3.75).

■ **Kavitavali.**
A dramatic poem by the most famous medieval Hindi poet, Tulsi Das. George Allen and Unwin Ltd., London (32/-).

■ **The Woman in the Dunes.**
The Japanese novel by Kobo Abé which won the Yomiuri Prize for literature in 1960, and from which a successful film was made. Alfred A. Knopf, New York ($4.95); Secker and Warburg, London (21/-).

■ **Flowers in the Mirror.**
By Li Ju-Chen. A 19th century Chinese classic—a combination of historical romance, fairy tale and Chinese Gulliver's travels. Peter Owen, London (35/-); University of California Press, U.S.A. (in press).

■ **The Manyoshu.**
A remarkable anthology of 1,000 poems from 7th and 8th cent. Japan. Columbia University Press, New York and London ($12.50).

■ **An Anthology of Sanskrit Court Poetry.**
An 11th century anthology of Sanskrit verse in a superb translation. Harvard University Press, U.S.A. ($15.00); distributed in the U.K. by Oxford Univ. Press, London.

All the above titles can be ordered from your local bookseller or from the publishers. In the U.S., the Unesco Publications Center, 317, East 34th Street, New York, can supply all volumes.

THE U.N. STORY

■ **The Quest for Peace.**
A series of 24 Dag Hammarskjold Memorial Lectures edited by Andrew W. Cordier and Wilder Foote. Columbia University Press, New York and London ($7.95).

■ **Toward World Peace.**
Speeches and Public Statements 1957-1963 by U Thant. Thomas Yoseloff, New York and London ($7.50; 50/-).

■ **Planning for the Needs of Children in the Developing Countries.**
The United Nations Children's Fund. (Hard-cover, $3.95; soft-cover, $1.95.)

■ **Telling the U.N. Story.**
By Leonard S. Kenworthy. New approaches to teaching about the United Nations and its agencies. Unesco, Paris-Oceana Publications Inc., Dobbs Ferry, New York ($2.00).

ber countries "to intensify their investigations of marine pollution in all its "aspects", and set up a special group to examine ways of furthering national and international studies of oceanographic processes affecting pollution.

Dynamic museum

The Neuchâtel Museum of Ethnography in Switzerland often seems to be doing its best to look as little like a museum as possible. At its recent exhibition of "The World's Children at Play", the visitor's eye was greeted by 1,000 feet of wall space where children had painted their own choice of subjects on this theme, and his ear by recordings of children playing street games. The museum uses walls, furniture and light to create an atmosphere that enables visitors to see beyond the exhibits and the bounds of this ultra-modern museum building. Unesco's quarterly, "Museum", devoted an entire issue (Vol.XVIII, No 1, 1965; $2.00, 10/-stg) to the Neuchâtel Museum, which celebrated its tenth anniversary in November 1965.

Balkan soil studies

A group of 15 soil scientists recently made a study tour of five Balkan countries, under the sponsorship of FAO, the United Nations and Unesco, to exchange information on the classification and land use of the major soil groups in Thrace (Turkey), Bulgaria, southern Rumania, eastern Yugoslavia and eastern Greece. Similar study tours have been made in the U.S.S.R., Brazil, Rumania, Mexico, Japan and India to collect information for the Soil Map of the World Project being carried out by FAO and Unesco.

Flashes...

■ *A cheque for $250,000, the entry receipts of an exhibition on "5,000 years of Egyptian art", held in Tokyo, has been given to the U.A.R. Government for the Unesco trust fund financing the dismantling and transfer of the Abu Simbel temples in Nubia.*

■ *Speedier and more accurate warnings of the Pacific Ocean's devastating tsunamis —seismic sea waves, wrongly known as "tidal waves"— are the aim of an International Tsunami Warning Centre at Honolulu set up by the Intergovernmental Oceanographic Commission.*

■ *To help meet the world's need for more man-made forests, the developing countries have already planted some 4.5 million hectares (11 million acres) of new forests, reports FAO.*

■ *Today Latin America has only about 100,000 practicing physicians—less than half the number it actually needs, according to WHO. By 1980 the continent will need 350,000 doctors.*

■ *Under an agreement between Jordan and the World Food Programme, food aid worth nearly $117,000 will be provided for some of Jordan's schools and community development centres this year.*

THE INNER NATURE OF SCIENCE

by Warren Weaver

The Kalinga Prize for the Popularization of Science was awarded by Unesco in 1965 to Dr. Warren Weaver of the United States. Dr. Weaver, a distinguished science writer, science consultant and a former president of the American Association for the Advancement of Science, was presented with his award by the Director-General of Unesco at a ceremony in Unesco House on October 14. In his address, Dr. Weaver discussed four aspects of the problem of the interpretation and diffusion of science: the importance of science, the difficulty of interpreting science, the special need today for this interpretation, and why the interpretation by the science writer, however difficult it may be, "must be carried forward continuously, interestingly but never trivially, accurately but clearly, humbly yet enthusiastically, ardently yet patiently." In his conclusion, Dr. Weaver declared:

"To live, in the modern world, without some reasonable knowledge of science is to be critically handicapped in any attempt to understand many of the major forces which are shaping our present society. It is to have all the senses dulled, and not only dulled to what is going on in the world but to be dulled to the beauty and to the spiritual significance of science, unaware of the incredible but lovely way in which our universe is put together, unconscious of the inspiring unity which binds together all life and all that is at the moment not alive, uninspired by the vision of man's new capacities to control his environment and to liberate himself for new and more noble destinies.

"It is a sad pity that so many persons think of science exclusively in terms of the hardware—the devices that it makes possible. It is unfortunate that those with a slightly clearer vision see science chiefly as the healer and the feeder. In the long run it will, however, be worst of all if men cannot be made to understand the essential inner nature of science.

"There are some so misled as to view science as a sort of mechanical monster, grinding ever forward, producing terrible engines of destruction, forcing everything into dull conformity with inexorable and soulless logic, reducing everything to baffling but all-powerful equations.

"To correct those false views I view to be a major duty of those who interpret science to the public. For those false views separate science from the rest of life.

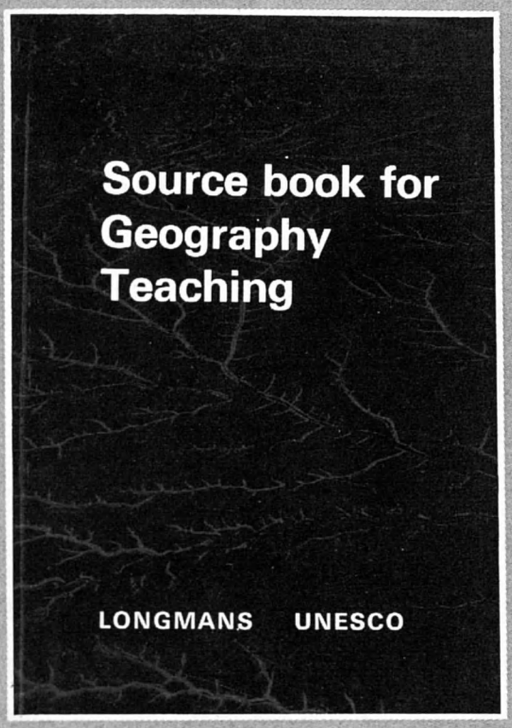
"From the time of Roger Bacon there have been those who consider that the business of science is simply to collect a lot of "facts" (hard facts, we often say, implying necessary permanency, accuracy and objectivity) and then construct a theory to explain them. That theory then is true; and all must bow before it.

"But we now fully recognize what we should always have realized—first that we obtain so-called facts only through observation, and that the observer is himself an essential part of the fact system, thus at one stroke destroying both ultimate precision and ultimate objectivity; and second, we know that elements of choice, presuppositions which have neither a factual nor a logical analytical basis but do have both a personal and a cultural basis, enter into the structure of all theories and into the selection of the group of facts to be dealt with.

"That our scientific knowledge progresses by unjustified (and unjustifiable) anticipations, by guesses, by tentative solutions to our problems, by conjectures and that these conjectures, although they are controlled and refined by criticism, can never be positively justified is a viewpoint massively and convincingly defended by the great logician and philosopher Karl R. Popper. Science proceeds, Popper says, not by proving that certain statements are correct, but rather by showing that certain statements are incorrect. If this explodes the myth, apparently comforting to some but basically frightening, that science is the austere custodian of unassailable truth, note that at the same time it forces science to join hands with all other human endeavours—for we all learn by our mistakes.

"You must not misunderstand why I have made these comments about the essential nature of science. I have not done so to detract in any way from the practical value of science, nor to depreciate the magnificent successes of science. But these very successes, when viewed superficially and when over-valued as they can so easily be, tend to separate science from the rest of men's lives. Whereas the great need, as science marches forward, is to assure that science be merged into a mutually advantageous companionship with all of the humane arts, with philosophy and with religion."

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.



Of all school subjects, geography is perhaps the best suited to promote mutual understanding between peoples. Geography can show not only how peoples have lived and are living, but also what they have contributed to the common heritage of mankind. Unesco's aim in publishing this book is to aid and guide all who teach or study in the world's schools. Practical advice is given on how to improve teaching methods and provide the proper materials for effective geography teaching at primary and secondary levels.

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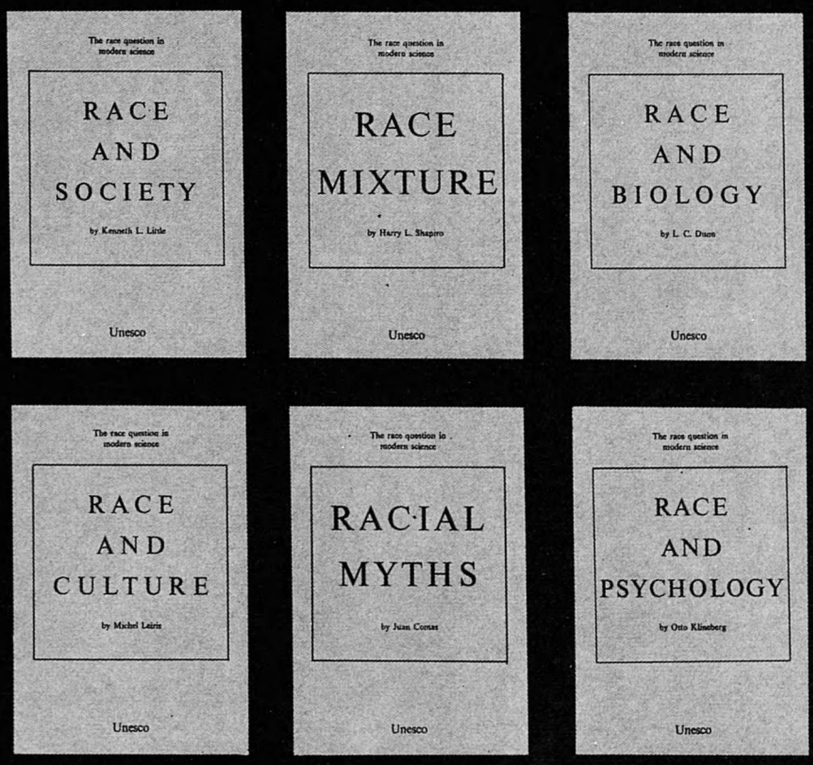

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SKI-ING ON A RADIO TELESCOPE

Wearing water skis to distribute his weight evenly, a worker crosses the vast steel mesh reflector of the world's largest radio and radar telescope near Arecibo, Puerto Rico. Suspended 500 ft. (150 metres) above him is the huge focusing device which transmits radio waves to the mesh, which then reflects them as a beam into outer space (see page 8).

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